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VOYAGER MESSAGE

POSELSTVÍ NA SONDÁCH VOYAGER

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SUMMARY

The theme of this work is the Voyager message that the U.S. National Aeronautics Space Administration (NASA) sent to the universe in 1977 on interstellar probes Voyager I and Voyager II. Voyager message consists of a phonograph record – called Golden Record - that carries a message for extraterrestrial civilization. The work provides the basic overview of scientific search for extraterrestrial life and describes the NASA Voyager program. Except for the basic overview of the message contents, the work offers an analysis of both visual and audio parts of the Voyager Message compilation. It employs the anthropology of science as an essential theoretical framework for examining the message contents. The work explores the reflections of scientific viewpoint and supposes science as the fundamental concept that shaped the composition of the Golden Record and considers mathematics as an universal tool of interstellar communication efforts.

KEY WORDS

Voyager Message
Golden Record
Anthropology of science
Extraterrestrial life
communication

ABSTRAKT

Práce pojednává o poselství umístěném na sondy Voyager I a Voyager II, které americký Národní úřad pro letectví a kosmonautiku (NASA) vyslal do vesmíru v roce 1977. Poselství na sondách Voyager se skládá z gramofonové desky nazývané Zlatá nahrávka, jež obsahuje zprávu pro mimozemskou civilizaci. Práce obsahuje základní přehled snah nalézt život mimo Zem a popisuje Voyager program. Kromě základních informací o obsahu Zlaté nahrávky nabízí analýzu obou jejích částí: vizuální a zvukové. Antropologie vědy byla použita jako základní teoretický přístup k analýze obsahu zprávy. Práce také zkoumá projevy vědeckého pohledu na svět a považuje vědu za základní koncept který ovlivnil obsah Zlaté nahrávky a matematiku pak za universální nástroj pokusů o mezihvěznou komunikaci.

KLÍČOVÁ SLOVA

Poselství na sondách Voyager
Zlatá nahrávka
antropologie vědy
mimozemský život
komunikace

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1. INTRODUCTION

This work deals with the Voyager Program, specifically concerning the messages that the U.S. National Aeronautics Space Administration (NASA) sent to the universe in 1977 on robotic interstellar probes Voyager I and Voyager II. Not the first interstellar messages in the human history – known as Golden Record or simply Voyager Message – are two identical phonograph records that were placed on both Voyager spacecrafts and its contents was assembled to hand over the information about life and culture on planet Earth to its potential recipient.

A human curiosity and interest in fascinating yet unanswered question about an extraterrestrial life have its reflections not only in worlds of fantasy but also in theoretical, scientific approaches. The first step toward rational base and was the radio message transmitted from Arecibo that was followed by small plaques installed on Pioneer 10 and Pioneer 11 spacecrafts, and finally Voyager messages. In the same way, also the Voyager Mission encompasses the time old question of extraterrestrial recipient, different life forms, and simply for other life in the universe.

But since the Golden Record is the product of one of the top science centres of the post-modern world and since the project was not only financially but also ideologically and officially supported by the U.S. government, it is essential to explore the scientific purchasing this hypothesis. Into some degree, we deal with legitimatization of originally suspect idea and its transformation into serious enterprise. It is important to note that the Voyager Mission was a component part of NASA Space Exploration Program and that it proceeded during the Cold War Era. Not exclusively the historical background and context of politics influenced and shaped the final form of the message.

Undoubtedly, we may find many general objections to the act or idea of sending these messages in to the universe and may question the informative value of the Golden Records. Not surprisingly, many objections were raised by the scientific community, general public, and media. From a sociocultural perspective, the act of

message sending has been situated into particular sociocultural context and as such; it has its cultural dimension. The mini encyclopaedia was written for the unknown recipient, the book that communicates the story about humankind in both visual and audio ways. There is neither such similar message nor compilation that would be fixed into that extensive form. Sociocultural approach to the GR contents may provide us with better understanding the principles that constitute and form the contemporary western society. This is the reason why a special attention has to be shifted to its very composition and particularly to the fundamental concepts behind the Voyager messages. This mission objective draws our attention particularly when we know that the Voyager Messages were sent on behalf of humankind.

For many reasons, the Voyager Mission deserves our consideration and should be studied with special interest and therefore, the basis of this dissertation is to investigate the premise, subject matters and cultural dimension of the Golden Records. Since it seems that the Voyager Messages more or less articulates the specific ideas of a particular 'culture', it is important to determine what was actually sent and why. The Golden Records was designed to communicate a story of humankind, its evolution in time and space, and possibly its current situation. And in fact, it already does.

Metaphorically expressed, from the lonely island lost in the waste of space the bottle was thrown in hope that somebody someday will take it out of the deep endless waters. In 2008, the recipient of the "message in the interplanetary bottle" is the student of anthropology. Allow me now to undergo the voyage to the roots and context of Voyager Mission and to introduce you the Golden Record from the sociocultural perspective.

2. THE RESEARCH QUESTIONS

We do not deal with an isolated instance and it is therefore appropriate to describe the analogous projects and to make an effort to clarify the appearance of the scientific search for extraterrestrial life. The first point of investigation should be to look to the history and principally at the conceptual framework of the idea of extraterrestrial life and its development within the context of science. Several scientific projects that preceded the Voyager Message will be elaborated on in Chapter 5 in order to work out the understanding of the conceptual framework of the Voyager Message.

The Golden Record is an extensive and wide-ranging compilation, which is the reason why the essential part of this study makes rather systematic efforts to explore and familiarize the reader with its basic characteristics. We will learn more about the Pioneer and Voyagers projects in general as well as about the Voyager Mission in Chapter 6. The sociocultural dimension of the various data placed on the record to the extent of both visual (diagrams, picture gallery) and audio (sounds, greetings, music) messages of the Voyager is our basic concern. Therefore logically follows closer look at each component parts of the Golden Record in Chapters 7. and 8. This analysis explores the composition of the data assembled and its components to answer the first research question:

What does the message contain?

To achieve our purpose, we investigate some conclusions why this particular type of documentation was assembled to describe humankind and its environment. Our question about the type of representation should hint how the Voyager story was communicated and what language(s) were preferred. We will analyse this representation in Chapter 9. that deals with life on Earth and its evolution. We will probe the documents of the Golden Record, looking for definition of the essence of life in terms of what the Golden Record represents. This analysis continues in Chapter 10. that concerns with life in context of society and technology. We should add emphasis on the fact that the Voyager Messages are rather local phenomenon that was set into specific context. This axiom forms our second research question for what

perspective was truly represented:

What were the preferred channels of communication?

We elaborate this question further and analyze it with context to the history of science, social theories, and concepts of culture. We have a detailed look on the description of humanity and description of its environment in order to recognize the concepts behind the GR. Since the GR was intended to communicate a story, the storytelling activity will not stand aside from our concern. We will offer particular instances from the GR to foreshadow the further possible meaning of the GR. The short-range comparative experiment is performed in Chapter 11.

2.1. ABBREIVATIONS USED

GR	for Golden Record
IE	for Interstellar Envelope
VM	for Voyager Message
PM	for Pioneer Message
AM	for Arecibo Message
CETI	for Communication with Extraterrestrial Intelligence
ET life	for Extraterrestrial Life
IAU	for International Astronomical Union
JPL	for Jet Propulsion Laboratory
NASA	for National Aeronautics and Space Administration
NAIC	for National Astronomy and Ionosphere Centre
SETI	for Search for Extraterrestrial Intelligence
UFO	for Unidentified Flying Objects
UN	for United Nations

3. APPROACH AND METHODOLOGY

As previously mentioned, the primary research interest is to analyze the data on the Golden Record (GR) and the Interstellar Envelope (IE), in order to find out what actually this interstellar *"message in a bottle"* (Sagan, 1986: Nov.) contains. Since the messages on Voyager I and Voyager II are identical, we will from this place on use a singular form of noun 'message' to refer on both Voyager messages. The same counts for Pioneer plaque(s).

The theoretical foundation for this dissertation is grounded in science studies. The anthropology of science (or science studies), are relatively recent steam within sociocultural anthropology. Labinger (1995) in his study uses another label, the "SCS" – sociological/cultural studies of science. Together with Saran Franklin (1995), we believe that *"science studies ... are significant culture area within anthropology."* Similarly, Harding (1991) stated, *"From a sociocultural perspective, it is virtually irresistible to regard contemporary sciences and their technologies as fundamentally a social problem."* Science studies are essential theoretical framework for examining the message contents and for us the basic standpoint from which the GR and its contents is viewed.

When working with the GR I will be employing methodologies stemming from visual anthropology of decoding or translating. The process of *"decoding"* or *"translation"* (Collier and Collier, 1986) involves the abstraction of visual evidence and its transcription into verbal form in order to develop categories for further research and analysis. The qualitative comparative method will be supported by detailed, and contextualized descriptions. The microanalysis is the appropriate method for dealing with the question if there are cross reference between visual and audio parts of the GR and if they compliment one another. The comparative method will be used in the experimental part of this dissertation where we will document the paradigmatic characteristics within the VM data frame.

In order to broaden my perspective, I have studied NASA documentation of the Voyager Missions, which includes the complete contents of the GR. To

understand the background of the VM it was essential to analyze the scientific discussions concerning the possibility or probability of life in the universe. Since the disposition of the mission steams from NASA and its workers, official NASA documents were used to become familiarized with the environment and theoretical background.

To fulfil the demand on the reflexivity of anthropological approach, I hope the short explanation of my interest in the GR would be both desired and relevant. Bourdieu (2002) in his note on methodology in anthropology calls the reflexive process the *"objectivation of the subject of objectivation*." Not only the research subject but also the researcher and his/her personal together with social background, personal experience and the past or the relation to this past, is the subject of reflexive effort. As Bourdieu described, the past might be the source of *"systematic distortion of evocation and thus of memories evoked"*. The socio-analysis of this relationship results in the *"reconciliation of the researcher with himself and his social properties"* (Bourdieu 2002).

More or less a coincidence attracted my focus on the Voyager project. Astronomy has been my personal interest and leisure activity for many years. I was reading Cosmos by Carl Sagan and I already knew that several messages were sent into the universe and I had sufficient knowledge of the Voyager mission. I must admit that I was charmed by the VM and as a sci-fi fan; I accepted the act of sending interstellar messages with rather enthusiasm, as I, myself had also participated on the SETI@home Project for a short time.

However, despite my experience, I looked at the image of the GR in my book from entirely new perspective. I suppose that my studies of philosophy and anthropology enabled me to take different viewpoint. Later I was surprised when I

studied the extent and the global dimensions of the data and its organization. My attention was drawn and my curiosity provoked even more. I realized that my approach was influenced by my personal interest and enthusiasm about Space exploration programs. In order to learn more about my new perspective and to separate my personal views from my research, I asked few people (friends, colleagues from my department, people I know) what they knew and thought about the VM. This inquiry was neither systematic nor detailed because I wanted to focus my research interest on the social theories and I did not intend to conduct field research. My objective was to problematize the concept that I was familiar with and to attempt to make it unfamiliar. At the same time, I started to make notes on this topic.

A general view which became apparent and important to me was the common persons misconception that UFOs and the VM were synonymous. Similarly, I was surprised that some of my respondents were not comfortable with the fact that the message was sent. I was met not only with disagreement but an almost paranoid response that a detailed description (DNA particularly) of human kind was wandering through the galaxy. The VM was often accepted with a matter of extreme delicacy or even as a violation of human personal data. Another contribution from these informal discussions was the importance of religion and religious views in answering the question for the possibility of ET life. Moreover, the contents of the GR to my respondents and me were complicated and intelligible. However, these reactions inspired me to future research and even encouraged my current interest in the VM and similar projects.

As mentioned above the reflexivity of anthropological work is very important issue in this context. Every researcher who studies his/her own culture has to be cautious and avoid employing his/her own perspective to avoid imposing ideas upon the reader. Since we are concerned with western sociocultural area, our position is according to classic anthropological distinction, inevitably emic. We must take into consideration that the nature of the Golden Record requires the interdisciplinary approach. As suggested above, the contextualized description of the VM seems to be suitable in situating the VM into particular sociocultural, political, and historical context.

A short note on the organization of this work is suitable in this chapter. It is technically impossible to provide the reader with comprehensive description of the GR contents. Where necessary the appropriate images and descriptions will be attached directly to the text. When referring to images and while analysing specific visual parts of the GR, the subject will be guided by the description and comments. In order to provide the reader with sufficient and reasonable amount of information, the lists of pictures, voices, and music from GR are attached to the chapters that describe and analyse given documents. The NASA uses fixed terminology and settled phrases. The expressions: “Pioneer Plaque“, “Voyager Message“, “Interstellar Message“, “Interstellar Envelope“, “Golden Record“, “Scenes from Earth“, “Sounds of Earth“, “Greetings from Earth“, “Music from Earth“ are quotations from NASA documentation. The titles of figure and sounds from the GR were adopted from NASA project documentation. All of these and the complete contents of the GR are available from Golden Record web page: http://www.goldenrecord.org, or from Voyager Mission web page: http://voyager.jpl.nasa.gov

4. LITERATURE OVERVIEW

The main and ultimate source of VM and GR official documentation is NASA corporate web page: http://www.nasa.gov/. The same counts for analogous NASA projects, e.g. the Pioneer Program. Together with the project description and technical documentation, the NASA Conference Publications are very important source of information, also available for public on NASA History Division web page. These documents not only recorded the debates on possibility of ET life but also provide us theoretical framework of question for what life entails in the scientific point of view. NASA publications witness the epoch-making shift from world of fantasy toward

valid scientific question.

The most comprehensive description of these debates offered chief historian of NASA History Divisions, Steven J. Dick (1998) in the popularizing book *Live on Other Worlds. The 20th-Century Extraterrestrial Life Debate* (only Czech translation available). His article *Anthropology and the search for extraterrestrial intelligence* (S. J. Dick, 2006) published by Anthropology Today, uses the historical synopsis to highlight the role and status of social sciences within the SETI Program. Despite there are several remarkable anthropological studies on SETI Program and references to the search for ET life beyond Earth, we provide the reader with the basic overview of these ideas only. We use the SETI Program cornerstone laid by Cocconi and Morrison (1959) *Searching for Interstellar Communication*. Book *Beyond the Blue Horizon. Myths and legends of the Sun, Moon, Stars and Planets* by American astronomer E. C. Krupp (1992) is interesting for the interdisciplinary efforts and notes on modern mythology in context of technology.

High number of publications dedicated to Voyager message and to the ET life search suggests that the key person of the Voyager message assembly was the American astronomer Carl Sagan. The apparent importance of Carl Sagan's publications is also supported by the extent of direct quotations. For us the most important source is his book *Cosmos* (1998 in Prague, originally published in 1980) that also inspired this work. Mr. Fries from NASA HQ History Division recommended me Sagan´s publication *Murmurs of the Earth: The Voyager Interstellar Record;* the definitive story of the GR. Unfortunately, this book is beyond the reach because its edition had been sold out in the U.S.A. so I had to cope with NASA official documentation of the Voyager project and other relevant sources. From Sagan´s publications were except for *Cosmos* important also *Notes in an Interplanetary Bottle* from Harper's (1986:Now.) and article *On the Detectivity of Advanced Galactic Civilizations* (1973).

Not to rely on internet resources exclusively, the Evans (2007) publication *NASA´s Voyager Missions*, Dethloff and Schorn (2003) *Voyager´s Grand Tour* were used. Listed books contain detailed description of the Voyager probes, including basic facts about the GR.

The body of literature concerning the VM and Pioneers from a perspective not exclusively technical or astronomical is unfortunately not extensive. The first direct analysis of the Pioneer message originates from Havel (1996), the article *Jsme tady taky! (We are here too!)*. Havel investigates not only the premises and subject matters of Pioneer Plaque but also has draws its political context. *E.T. Culture. Anthropology in Outerspaces* edited by Battaglia (2005) is interesting compilation that contains various perspectives to deal with the UFOs phenomenon (Aliens, E.T.). A study *Alien Tongues* by Samuels (in: Battaglia 2005) resolves the VM, PM, and sci-fi genre into linguistic assertions. Samuels deals with the basis of communications with alien life forms and alien languages in sci-fi genre and analyses its linguistic features. Samuels offers the first separated anthropological study of the VM (or the only one I manage to find) and his work contributed to the comments on audio and visual part of the GR as the theoretical framework.

With the controversial UFOs topic deals Grunloh (1977) in very interesting article *Flying Saucers*. Grunloh highlighted the anthropological viewpoint when analysing UFO sighting as a cult within the contemporary society and described it as a cult that is related to the religious visions of the past.

The *article Science as Culture, Cultures of Science* by Franklin (1995) provides us the theoretical framework of science studies. It includes the historical description of emergence the science studies within anthropology and the outline of the possible and actual parts of these studies (lab-environment etc.). For similar reason the book *Whose Science? Whose Knowledge? Thinking from Women´s Lives,* by Harding (1991) is essential for us. Harding deals with feminism research. For this study the description of science as information and meaning producing activity were important and the theoretical base from this book also enabled to monitor the reflections of science in society (and on the GR). Most important terms adopted from Harding are *"mind-set," "knowers,"* and *"scientifically literate."*

Another important publication is Labinger´s (1995) *Science as Culture: A View from the Petri Dish*. This polemic study points out to interdisciplinary barriers and proposes collaboration between social scientists and scientists. For us, the *'SCS'*

term is important as well as a viewpoint of a practising scientist on social and cultural studies of science.

Martin (1991) in *The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male- Female* shows the gender stereotypes using the description of the egg and sperm representation within the scientific point of view, particularly in biology. This way of representation was the guideline for visual analysis of the GR. For the same reason the Newman´s *Fetal Positions* were important, principally the illustrations and historical profile of anatomical models and ideas on science in general. Newman deals with organizations of gender and sexuality. On base of this article, the analysis of 'Life creation story' was made. *Persistence of Vision* (1989) by Haraway studies the analogy between the primatology and human sciences. For this piece of work, the most important was the theoretical issue outlined by Haraway, principally the description of the "*scientification"* process.

Historian of science, T. S. Kuhn (1997, in Prague, originally published in 1962) in his revolutionary study *Structure of Scientific Revolutions* characterized the *"normal science"* as the process of *"riddle solving."* The notions on history of science, development of science, paradigm shifts, and on science as a process that changes with time were essential for this work. Principally the basic concepts of his study - science as a "riddle solving" and "paradigm" were most important for us.

Kirby in his essay *Science Consultants, Fictional Films, and Scientific practice* (2003) introduced the fictional films as a new representation aspect of the knowledge producing activity (science) and treated of influence of fictional media on scientific practice – promotion of conceptions of nature – and popularizing of science.

To set the GR to context of development theory, several important readings were made. Most important is Schech and Haggis's (2000) introduction to *Culture and Development: A Critical Introduction* particularly for detailed description of Englightment movement and its basic ideas and characteristics that constitute a framework of modern knowledge. Tipps (1973) in analytical study on *Modernization theory and the comparative study of societies. A critical perspective* shows links between development and modernization perspective. The study *The Idea of Progress*

by Shanin in The Post-Development Reader (in: Rahnema, Bawtree, 1997) considers the idea of progress as a secular one, and describes impacts of this idea as a powerful tool of modernization. To gain a better insight into the development theory, Hettne (1995) *Development Theory and the Three Worlds* and Bendix (1967) in *Tradition and Modernity Reconsidered* were included.

As the additional reading was used the Tipler´s article *The Anthropic Principle: A Primer for Philosophers*. It deals with the philosophy of physics and it explains the tenet of the anthropic principle. To set the NASA Space Exploration Program into the context of politics and the U.S. domestic affairs, the recent political study: *Hegemony or Survival. America's Quest for Global Dominance* by Noam Chomsky (2006 in Prague, originally published in 2003) was used. To learn more about reflexivity of anthropological fieldwork Bourdieu (2003) *Participant Objectivation* were studied. Several more additional readings were made as specified in Sources.

5. SCIENTIFIC SEARCH FOR EXTRATERRESTIAL LIFE

"It follows, then, that near some star rather like the Sun there are civilizations with scientific interests and with technical possibilities much greater than those now available to us."
Cocconi, Morrison (1959)

Christian philosopher Giordano Bruno challenged the medieval belief of the central position of Earth in relation to the universe from a philosophical standpoint. Bruno was relentless apologist of Copernicus theory but his ideas were directed towards the

borders of Solar System. His revolutionary idea that the Sun is simply one of the stars and that the others stars are the suns with planets similar to ours were quelled with a blazing bonfire in 1600 that abruptly ended his life. Bruno also suggested although these distant suns and planets exist; only Earth has the privilege to sustain life[1].

It is of great interest that the first sci-fi was written by astronomer Johannes Kepler. His fantasy book *Somnivm, seu Opus Posthumanum de Astronomia Lunari* was published in 1634! Kepler used the perspective of hypothetical Moon inhabitants (lunar beings) to describe the astronomical phenomena (eclipse, phases, motion) from extraterrestrial perspective. Another book of great importance is undoubtedly the *War of the Worlds* by H. G. Wells. Forty years later, the radio adaptation by Orson Welles and his Mercury Theatre on the Air made the *War of the Worlds* famous and drew the attention of public to this mysterious and enigmatic idea. In his popular study, S. J. Dick (1998) mentioned H. G. Wells and two other *"inventors of extraterrestrials"* - Jules Verne and Kurd Lasswitz. It is not necessary to comment the further boom of the sci-fi genre for it is manifested in many branches of popular culture (movies, sci-fi series, books etc.). The link between sci-fi and science was highlighted in many places, e.g. (in: Battaglia 2005) and Kirby (2003). Both mentioned that the movie Contact (1997) was based on the novel by Carl Sagan. Kirby (2003) outlined the science popularizing tendencies: *"Sagan (1995) felt that accurate scientific depictions in the media would facilitate a better public understanding of science."*

More than to explore the origins of the sci-fi genre, our intention is to show that science fiction and science go hand in hand with each other (Kirby, 2003). This relation can be seen in the sci-fi genre in 1979 in the closing scene of the full-length *Star Trek: The Motion Picture*. At the end, a superior extraterrestrial being returns the V-GER probe to its home planet with its message unread.

5.1. HISTORICAL OVERVIEW

To have a full understanding of the notion of sending a message into universe we will have a look on the history and settings of the EL search. The first key to understanding this notion is a three page long essay *Searching for Interstellar*

Communication that was published by Nature magazine in September 1959 and it is the beginning of scientific search for extraterrestrial civilizations. The importance of this publication was stressed in many places, e.g. by S. J. Dick (2006) as well as by Samuels (in: Battaglia 2005). The scientific search for ET civilization is connected with the beginnings of radio astronomy. According to Samuels (2005), the EL search started in 1930´s in Colorado Spring laboratory where Nicola Tesla *"detected radio signals from space in 1899"*. Tesla considered the radiocommunication as a possible way to communicate with other planets inhabitants. Marconi (radiotelegraphy inventor) according to Samuels suggested the use of numbers as *"a lingua franca for this communication"* (in: Battaglia 2005).

As both Samuels (2005) and S. J. Dick (2006) noted, the historical base for the formation of the SETI Program was following Cocconi and Morrison's (1959) statement: *"conjecture that extraterrestrial intelligences, if they want to be found, might likely communicate at 1420 MHZ, which corresponds to the time period of the hyperfine transition of neutral atomic hydrogen"*. A new leading idea as to why the ET search should be conducted has arisen: *"We therefore feel that a discriminating search for signale deserves a considerable effort. The probability of success is difficult to estimate: but if we never search, the chance of success is zero."* (Cocconi, Morrison 1959) This way a tone was established and Sagan (1998) when explaining and advocating for the GR ever after performed the same argument – it is just important to try.

General overview:

1899 Nicola Tesla detected the signal from space
1940 Radio antennas construction (Samuels 2005)
1958 NASA established
1959 Cocconi and Morrison's publication in NATURE
1960 OZMA Project
1961 Drake Equation (base for SETI Program Establishment)
1972 Pioneer 10
1973 Pioneer 11
1974 Arecibo Message
1977 Voyager Message

The speculative idea about the possibility of life on other planets got its base from a theoretical scientific approach. Originally, the dream of a few visionaries became a hard science. The search for ET life adopted the basic features of each branch of science- institutions, methodology, departments, and quotation index[2]. As S. J. Dick (1998) noted, from November 1961 through July of 1996, there were more than twenty-three conferences concerning extraterrestrial life. These conferences were not strictly an American affair since the former U.S.S.R. also arranged a number of meetings and the SETI program had its Russian sibling (CETI, Communication with Extraterrestrial Intelligence). Finally, also the *Declaration of Principles Concerning Activities Following the Detection of Extraterrestrial Intelligence* was drafted[3].

5.2. ET SEARCH – ONE MAN SHOW

The famous attempt to detect a signal from space and thus support the hypothesis with evidence of ET life is know as OZMA Project. This experiment was designed and performed by Frank Drake. In April 1960 at the National Radio Astronomy Observatory (NRAO) in West Virginia, USA, Drake pointed an 85-foot radio telescope at two nearby stars Epsilon Eridani and Tau Ceti in order to listen to extraterrestrial signals. Although the result was zero, active listening to the signals from the universe – the SETI Program - continues until the present days.

Just one year later, in 1961, we meet Francis Drake again. Drake presented to the scientific community the empirical formula, now known as the Drake Equation[4], which enabled us to calculate the number of advanced civilizations in the universe. It is interesting to mention that the Drake Equation according to S. J. Dick (2006) proves the indispensability of social sciences for the SETI Project. This equation includes all factors needed for potential evolution in the universe, e.g. astronomical, biological, and cultural. The last two mentioned factors, biological – the evolution of a civilization that uses radiocommunication, and cultural – the lifetime of such a civilization – belong to the realm of social sciences. Nevertheless, this formula has rather surprising consequences, now know as the Fermi Paradox appeared in 1974. It indicates that there is a possibility – or even probability - of millions of advanced civilizations in our galaxy (S. J. Dick, 2006). The logical consequence of the Fermi Paradox is that the universe is over-populated by advanced civilizations.

One of the significant events in the ET search was the Arecibo message (AM).

In 1974, the Arecibo radio telescope transmitted a data-package – the message was aimed at the globular cluster M13 in the Hercules Constellation. This attempt to contact the extraterrestrial life came just two years after the Pioneers but before the VM by three years. Until this moment, the radio astronomers were just receiving the natural radio noise of the universe.

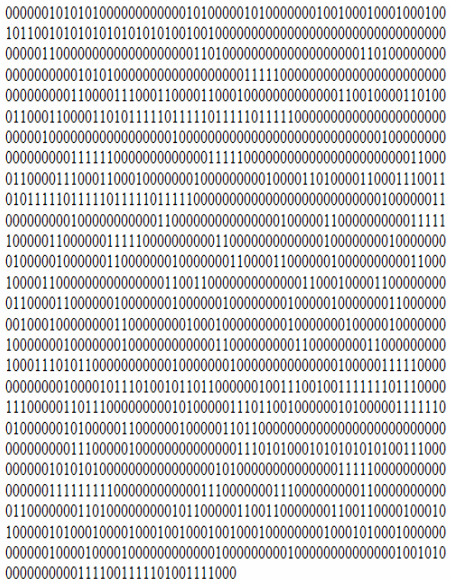

Fig 1.: Arecibo Message, 1679 'bits'

The message name originates from the transmitting location, a large radio telescope in Arecibo, Puerto Rico. The official name of the institution is the National Astronomy and Ionosphere Centre (NAIC). The reflector was built in 1963 and has a staggering diameter of 305 meters (1,000 ft) that covers one entire valley. These days, Arecibo is except for common observations activity used mainly as a source of data for SETI@home project.

The objective of this subchapter is to show how the basis of VM was formed. Let us have a closer look at the AM itself. The binary code was used to express that there is an intelligent civilization present on planet Earth. The language used is definitely not simple and its decryption demands a good knowledge of mathematics with an emphasis on conceptual thinking. At the same time, we can see the way the information was encoded. The AM in its unabridged version is portrayed in Fig. 1.[5]

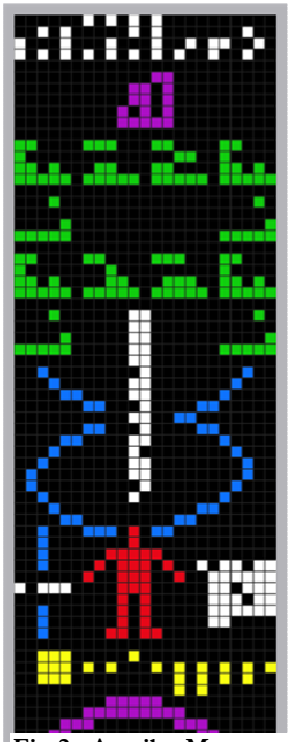

Fig 2.: Arecibo Message, NAIC, Cornell University

The '1979 bits of information' is the product of two prime numbers - 73x23 (Sagan 1998). This organizes the structure into a 73x23 matrix, which results in the attached image (Fig. 2[6].). After decoding the numerical labyrinth correctly the AM gives its message; a pixilated picture with encrypted information about life; leaving no doubt of capabilities of science on planet Earth. The cipher has diagram

characteristics and each colour used represents one type of information. The diagram contains: cardinal numbers 1-10 and atomic numbers of atomic elements (H, C, N, O, P), formulas for sugars, bases, and phosphate in DNA nucleotides, double helix structure of DNA, and number of nucleotides in the human genome. The diagram also describes the average height of human, human population on right, and schematic representation of Solar System (yellow colour, human stands on 3rd planet). In the bottom part of the diagram, we can identify the shape of Arecibo transmitting telescope and finally its diameter (Sagan 1998).

Authorships of the AM belong to Francis Drake and Carl Sagan. Soon we will meet these two scientists as creators of the Golden Record. AM not is not only the immediate ideological predecessor of the GR but also the first arranged expression of *"a lingua franca for this communication"* (Samuels, in: Battaglia 2005) which is considered numerical and mathematical. The AM provides insight into the contact message production. We can observe directly how the information about life was transferred to matrix, and what types of entries were chosen as relevant. We will see that a similar concept of communication or communication channels were used for both Pioneers and Voyagers messages.

5.3. ANTHROPIC PRINCIPLE

In order to understand the character and composition of the VR is essential to introduce the philosophical concepts of thoughts that constitute it. The Arecibo information contains the first relevant indication that the scientific representation is an important aspect of these issues. The following quote demonstrates the scientific definition of life in particular sight of physics. The quotation originates from Tipler (1988):

> *"In order to investigate whether life can continue to exist forever, I shall need to define 'life' in physics language. I claim that a 'living being' is any entity which codes 'information' (in the sense this word is used by physicists) with the information coded being preserved by natural selection. (I justify this definition in section 8.2 of Barrow and Tipler 1986). Thus 'life' is a form of information processing, and the human mind- and the human soul - is a very complex computer program. Specifically, a 'person' is defined to be a computer program which can pass the Turing Test (See Hofstadter and Dennett 1981, 69-95 (Chapter 5) for a detailed discussion of this test)."*

The designation of life as a form of information processing is interesting in context to the AM. The importance of an 'information' let us suggest a causal relation between

the scientific definition of life and the contents of message sent to inform about life. Sagan for example described life as a "*local transmodification of the matter into the consciousness"* and in context of uniqueness of humans referred also to cerebral cortex and R-complex (1998). Another base of life is described in following quotation that also contains the explanation of the weak anthropic principle (WAP). The basic attitude of mind performed by an anthropic principle is the *"drawing of scientific inferences from a consideration of Man's Place in Nature"* (Tipler, 1988). According to Tipler:

> *" ... WAP does not claim that our form of life (based on carbon, etc) is the only possible form of life. One can easily imagine non-carbon based forms of life, and indeed, as we shall see, a very speculative form of the Anthropic Principle assumes that non-carbon forms of life can exist. Such forms of life, if they do exist, are obviously not subject to the same selection biases that Homo sapiens is. But equally obviously, Homo sapiens is subject to the selection biases of Homo sapiens. Thus the Weak Anthropic principle must be accepted, for it is just an application of standard scientific logic."*

This way of reasoning implies the idea that the universe supports intelligent life. The anthropic principle is related to the cognition process, which is the ultimate condition of scientific data acquisition. We are learning about the universe because we were adapted to this environment, as Sagan formulated *"We are the way for the Cosmos to know itself. "*[7] The interpretation of the data is also a question of our ability to understand and interpret our cosmic environment. Reversely, *"in some way, intelligent life is essential to the Universe",* which also describes the basic idea of Strong Anthropic Principle 'SAP' (Tipler, 1988). Intelligent life on planet Earth (and possibly on other planets) in cosmological context is therefore no coincidence but the result of environmental conditions.

We have shown in this subchapter that there is the philosophical framework that works with carbon- and non-carbon base. Similarly, in 1979, the NASA Conference *On Origin of Life* took place. The publication that followed the conference is important breakthrough in establishing the search for outer life as a serious and valid discipline. These debates also work with the concept of 'carbon base' life.

Moreover, in these debates the certain quest for extra solar planets with the traces of water on its surface was established. The conditions of extraterrestrial life are the result of logical scientific possibility.

Several theoretical approaches were established to justify the belief that there is life in the universe, for instance the Panspermic Idea, the Parallel (or convergent) Evolution Concept and finally the Drake Equation. These approaches work with concepts of homogeneity in space, Earth-like conditions on other planets, carbon base of life, natural selection etc. These principles are also the symbolic expression of an alternative hypothesis that life was spread equally around the universe and that it is in its very principle the same. Not only has the Sun lost its unique position as argued by Bruno but also life has lost its uniqueness on planet Earth. Nevertheless, in this point of discussion it is important to state that it is not only the evolution of life in any of its possible forms but also evolution of what is quite unproblematically referred as 'intelligent life forms' is presupposed. The intellectual spectrum was described by Mash (1993) as *"degrees of psychological, intellectual, biological, cultural, and technological similarity"*. As Sagan (1973) mentioned:

> *"We may study micro organisms, but we do not usually communicate with them. I therefore raise the possibility that a horizon in communications interest exists in the evolution of technological societies, and that a civilization very much more advanced than we will be engaged in a busy communications traffic with its peers; but not with us, and not via technologies accessible to us.*"

5.4. SETI PROGRAM AND ANTHROPOLOGY

The SETI Project is running until recent days. In 1999, the SETI@home project was established in 1999 and the volunteers from all around the world can participate on the analysis of the natural radio noise of the universe collected from Arecibo Telescope in order to detect regularity that might indicate an artificial source of the signal.

The SETI Program has been studied by anthropology on many places and the

literature about it is quite extensive. Because this work concerns with the VM, we provide the reader only with the basic overview. S. J. Dick (2006), the Chief Historian and Director of the NASA History Division, described not only the historical background but also outlined the possible future relationship between SETI Program and anthropology. The search for ET life is according to Dick the result of three important historical events: Cocconi a Morrison article, the OZMA Project (both referred above) and the Green Bank Symposium in 1961. These events are the base for the SETI Project formation in the 60ties.

The task of this article is to explore the role that anthropology plays in SETI Project and how: *"the two intellectual cultures of natural scientists and social scientists made contact"*. The basic presumption is that this contact is valuable for both branches but concerning the search for ET life, the systematic approach that would apply anthropology is missing.

In 1971, the international meeting in former S.S.S.R. was held and two anthropologists were present. This event established the tendencies to keep social sciences within this problematic issue. At the beginning of the 90ties, the social sciences got involved more into the discussion. This event happened on *'Cultural aspects of SETI Program'* (known under acronym CASETI) workshop. The result of this meeting was the recommendation that NASA should more concern with study of: *"appropriate analogies drawn from earlier human experience, and that study should concentrate on analogies based on the transmission of ideas within and between cultures in preference to analogies based on physical encounters"* (S. J. Dick, 2005)

> Point by point, the most valuable assets of anthropological approaches to SETI Program are the evolution of technological civilization (likelihood of technological civilization evolution), culture contact (contact scenarios, analogical studies of culture contacts on Earth), interstellar message deciphering and construction (linguistic anthropology) and cultural diffusion (analogical studies of human migration – an illumination of Fermi paradox).

5.5. 'E.T.' CULTURES

In context to extraterrestrial life, it is suitable to make short explanatory digression to UFO – Unidentified Flying Objects - phenomenon. There is something intriguing about UFO sightings and it constantly draws attention of the public and

media. This phenomenon should not be underestimated since it has grown to be widespread in recent years. "E.T. Culture. Anthropology of Outerspaces" edited by Battaglia (2005) offers an anthropological inquiry on aliens, encounters, UFO cults etc.

Another reference to UFO originates by Grunloh (1977). Grunloh offers the anthropological perspective on UFO sighting as a cult within social context and links it to religious visions of the past. This psychological explanation uses Jung's theory on psychic projections of unconscious elements. In this interpretation, the flying saucers are considered a modern myth that is the archetype and a result of *"collective unconscious of the nuclearspace age has projected a fantasy combining dread of possible interplanetary war and hope for salvation through extraterrestrial wisdom"* (Grunloh 1977)[8]. To avoid all possibility of being misunderstood let us just point out that the scientific search for life is in the centre of our interest.

6. NASA VOYAGER PROGRAM

6.1. PIONEERING VOYAGE OF PIONEER SPACECRAFTS

Before entering the Voyager Program the scientific projects that preceded it - the Pioneer Mission will be introduced. The Pioneer Program pushed the involvement of humans from passive listening to signals from the sky to creating a physical message. NASA launched the Pioneer 10 spacecraft in 1972 and Pioneer 11 followed one year later. Pioneers interstellar probes were revolutionary in many aspects, e.g. Pioneer 10 is actually the first man-made object that crossed the border of our Solar System. Along with Apollo Program, Challenger Tragedy, Hubble Space Telescope, and Creation of NASA in October 1958, both Pioneer and Voyager Programs belong to the 45 important moments in NASA history[9].

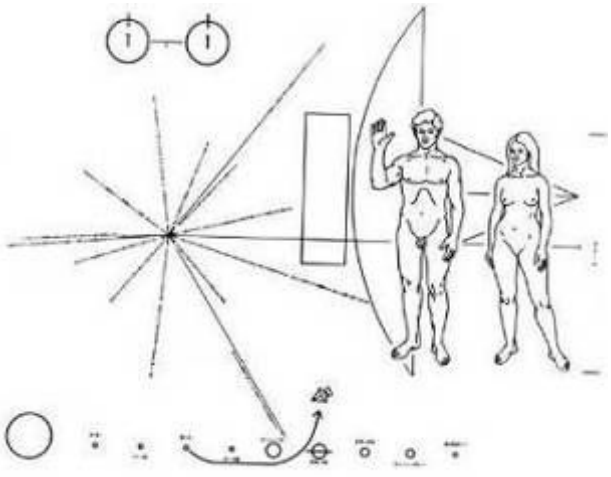

Fig. 3.: Pioneers Diagram

For us is important, that on two of the Pioneers probes, gold-anodized plaques were placed. Authorships of the plaque belong to Carl Sagan, Frank Drake, and Linda Salzman Sagan[10]. The PM consists of a few diagrams that denote simple information as we

could see on Fig.: 3[11]. In this respect it differs from the VM, which is a complex visual and audio story. In the upper left corner of the diagram, a hyperfine transition of neutral hydrogen can be seen. The hyperfine transition of neutral hydrogen is the universal feature of interstellar communication as stated by Cocconi and Morison (1959). The radial diagram bellow indicates the position of our Sun relative to fourteen pulsars[12]. In the bottom part the planets of Solar System are displayed, the line with arrow shows the origin of the spacecraft from third planet. The Pioneer spacecraft silhouette shown in the upper right part accompanies the pair greeting the inhabitants of other worlds with *"gesture of friendliness"* (NASA, 1977a). As Havel (1996) pointed, the representation of naked earthling pair caused the public indignation.

Here again we meet not only the mysterious symbolism of hydrogen but also the decoded information. Hidden to the right is a small diagram that represents the binary equivalent of decimal eight. When two of symbols combined, or precisely when *"hydrogen wavelength multiplied by the binary number representing 8 alongside the woman, gives her height"* (NASA, 1977a). The basic meaning of the Pioneer plaque was described by NASA (1977a): *"represents at least one intellectual cave painting, a mark of Man, that might survive not only all the caves on Earth, but also the Solar System itself. It is an interstellar stela that shows mankind possesses a spiritual insight beyond the material problems of the age of human emergence."* Havel (1996, cited Sagan) noted that the message was written in the language of science (neutral hydrogen, pulsars, nine planets, and binary arithmetic). This language of science was presupposed by Sagan as the only language we have in common with the recipients of the message (Havel, 1996).

6.2. BASIC FACTS ABOUT THE VOYAGER PROGRAM

In 1977, NASA successfully launched from the Kennedy Space Center at Cape Canaveral in Florida two spacecrafts Voyager II. (On August 20$^{th.}$), and Voyager I. (on September 5th). The primary purpose of those interstellar probes was to investigate the outer planets of the Solar System (atmosphere, satellites of these planets, determine magnetic field structure etc.) and the interplanetary environment[13.] After

this mission was completed, the probes continued the voyage to the borders of the Solar System and beyond. It was not only the unique alignment of the planets, optimal trajectory, and detailed images what made Voyagers project so famous. Identical interstellar messages were placed on external surfaces of both Voyager spacecrafts on behalf of all people on planet Earth (Fig. 4.[14]).

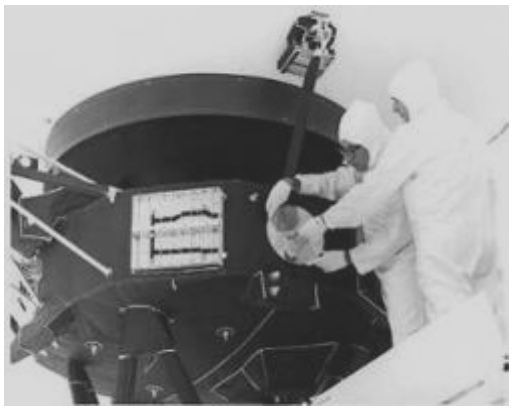

Fig. 4.: Golden Record installed on the Voyager spacecraft bus, NASA

The contribution of this legend in NASA Space Exploration Program History was emphasised in many places (e.g. Evans, 2007 or Dethloff and Schorn, 2003). The probes provided scientists with detailed high-resolution images of planets of our Solar System. Voyager II was the first probe in human history to explore distant planets Uranus and Neptune. According to the NASA mission overview, *"A total of five trillion bits of scientific data will have been returned to Earth by both Voyager spacecraft at the completion of the Neptune encounter. This represents enough bits to encode over 6000 complete sets of the Encyclopaedia Britannica, and is equivalent to about 1000 bits of information provided to each person on Earth."*[15] The total invested into the program from its conception in 1972, through the Neptune encounter is calculated at 865 million dollars[16]. The voyage, also described as *"Grand Tour"* (Dethloff, and Schorn, 2003), of those Marco Polos of the universe continues[17]. At the end of 2004, Voyager I entered the last border of Solar System, the heliosheat, which is located approximately 14 billion kilometres away from the Sun.

6.3. VOYAGERS – THE NEW PERSPECTIVE

"The Voyagers are destined – perhaps eternally – to wander the Milky Way."
Voyager.jpl.nasa.gov/mission/interstellar.html

Voyager program succeeded in many respects. Very famous is a picture of

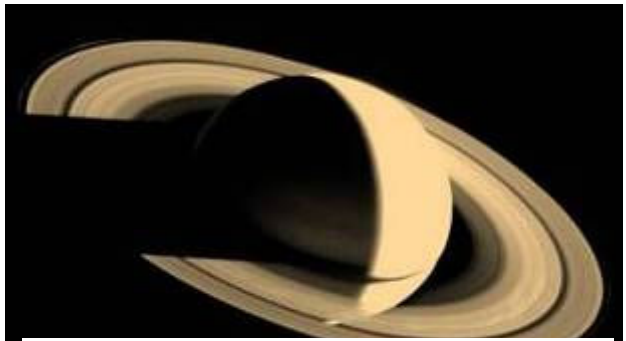

Fig. 5.: Voyager 1 looked back at Saturn (1980), NASA

the Earth and Moon in one single frame, actually the first one of this type ever made. Furthermore, the Voyagers had shown us the Solar System from a new perspective. We see fascinating things we have never seen before, one of the most remarkable being the far side of Saturn on Fig. 5.[18]

This new perspective was not mentioned without pursuing certain purpose. The ultimate success of the mission and the information provided by the scientists had also the terrestrial dimension and social impact. The UN Report of the World Commission on Environment and Development from 1987 (also quoted as Brundtland Report) has established the special commission to solve *"our common future"* to the year 2000 and beyond. In an overview *From one Earth to One World,* we can find the direct reflection on this truly extra-terrestrial point of view. The external view on the blue planet[19], '*one Earth'* might be one of the co-reasons of a certain stress on globalism issues. The Earth floating alone in the waste space, the only one planet we know so far that has the ability to sustain and support life, this was the idea that made the humankind to appear or accurately to be considered as a compact totality. And reversely, the idea of internationality and the aspect of globalism were already embedded in the VM. The concept that it is the mother Earth what is common for all people despite of the variety of cultures.

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English
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FROM ONE EARTH TO ONE WORLD

An Overview by the
World Commission on Environment and Development

1. In the middle of the 20th century, we saw our planet from space for the first time. Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset the human self-image by revealing that the Earth is not the centre of the universe. From space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery, and soils. Humanity's inability to fit its activities into that pattern is changing planetary systems, fundamentally. Many such changes are accompanied by life-threatening hazards. This new reality, from which there is no escape, must be recognized - and managed.

Fig. 6.: UN Report

Unfortunately, this external aspect has its negative consequences in the global policy. In context to the absolute triumph of the U.S. in the Space race with former U.S.S.R., we should mention that the Space Exploration Program was one of the factors to gain

the dominance of the U.S. over the space. As Chomsky in his analysis *Hegemony or Survival* of the U.S. global policy (originally published in 2003) referred (cited Steinbruner and Lewis) that in 1998 the short survey addressed for China of *"global conflict"* and *"space stations"* was outlined by the U.S. Space Command. The mentioned stations would provide the U.S. with the unique post to control the space and to military strike on any country all over the planet anytime. Chomsky also mentioned the Program of Strategic defensive initiative (also known by pertinent nickname *"Star Wars"*) that stands in the very beginning of the outer space militarization. This program started during the president Reagan government. The goal is to gain the military supremacy – the absolute control over the outer space and its use for military operations. According to Chomsky, the space military forces are another logical step in the global defence of the U.S.

Fig. 7.: The american flag on an american probe, NASA

The political considerations reminds us that only was the informative message for extraterrestrials hidden behind the cover diagram but also the U.S. state flag as documented on attached picture (Fig. 7.[20]). NASA's corporate politics as a national agency featured in the GR story for no another flags were attached to the GR but exclusively the American one. This symbolic expression of an intellectual and material property points out the fact that the scientific team of the GR had besides international considerations also own national background.

To finish this subchapter with rather optimistic perspective we will have a look at one of the most remarkable and famous photo of planet Earth. The snap of *"Pale Blue Dot"* as entitled by Sagan[21] was taken in 1990. The mere point of blue light in the middle of Fig. 8.[22] is planet Earth from the great distance of approximately 6 billion kilometres (4

Fig. 8.: The Earth on February 14, 1990, NASA JPL

billion miles). The externality of the representation goes beyond any border of imagination.

The voyage of probes continues. When we compare the trajectory of both Pioneers and Voyagers, we found out, that each is heading to different part of the universe that surrounds us. However, the prospects of encounter or contact made by Voyagers are not great. It will take about 40.000 years before Voyager I. reaches the first star known only by catalogue name as AC 79 3888 in the Camelopardalis (the Giraffe) constellation. Voyager II is heading to the constellations Sagittarius (the Archer) and Pavo (the Peacock) (Evans 2007).

6.4. INTERSTELLAR MESSAGE

"A billion years from now, when everything on Earth we've ever made has crumbled into dust, when the continents are changed beyond recognition and our species is unimaginably altered or extinct, the Voyager record will still speak for us."
Carl Sagan[23]

Billion years from now and billion miles from us, someone or something will perhaps detect the floating celestial messenger. Before opening the Pandora's Box, it will be necessary to guess the riddle of the Interstellar Envelope (IE), the protective jacket[24] made of aluminium. On the record jacket were engraved the symbolic instructions explaining the origin of the spacecraft and indicating how the sheltered golden record is to be played (See fig. 9.[25]). Imprisoned within an enchanted circle behind the cover engravings there are resting the phonograph record (GR), cartridge with stylus, U.S. state flag, and printed messages.

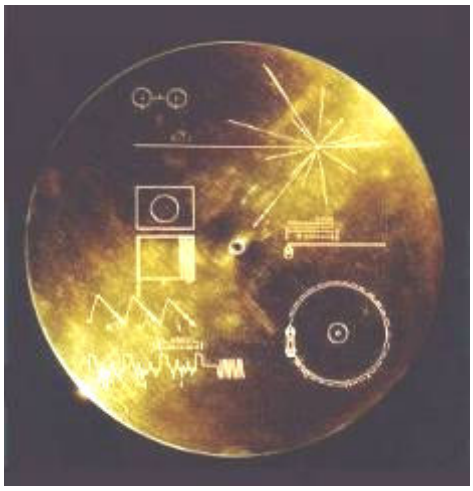

Fig. 9.: Interstellar Envelope - protective cover of the Golden Record, NASA

Differently from Pioneer 10 and Pioneer 11 informative plaque, the Voyager message contains the information assembled to communicate using multiple media. Not only the GR itself, but also the IE is the essential component of the message. The IE is a master key, and its decryption the necessary condition for watching and listening to the Voyagers story is to build a phonograph following the instructions displayed on the protective cover.

6.5. HOW TO ASSEMBLE A PHONOGRAPH

The detailed study of the cover diagram shows us also the conceptual link to projects mentioned above. First apparent link to the AM is the use of binary code to define the proper speed to turn the record. The time-period measurement is explained using the period associated with the fundamental transition of the hydrogen atom[26]. As we could see in previous chapter, it was stated by Cocconi and Morrison that the period of transition of neutral hydrogen that indicates the frequency for possible communication (Samuels, in: Battaglia 2005).

To this explanation is linked another diagram placed on the envelope, the illustration of the two lowest stages of the hydrogen atom. According to official description, "*The transition time from one state to the other provides the fundamental clock reference used in all the cover diagrams and decoded pictures.*[27]*"* There are more generic points – the model of hydrogen atom and the radial diagram defining the position of our Sun in the universe utilizes the fourteen pulsars both was adopted from the Pioneer plaque (for both please see Fig. 3.). Six of eight diagrams demonstrate the procedure of assembling the phonograph and the way of playing the record showing an outline of cartridge with stylus to play record elevation of cartridge using both side and front elevations.

Next step is to decode the video portion of the recording represented on illustration of a video signals wave shape and video image frame that shows the direction of scan. Again, binary code had been used to indicate the time of the scan. If properly decoded, compiled, and played, the first picture from the GR, the "*Calibration circle"* (Fig. 11.) appears.

6.6. GOLDEN RECORD

Fig. 10.: Golden Record, NASA

Those of us who created the interstellar record – well aware that different people would have made different selections - are delighted to help bring this message to you, essentially complete, as carried by Voyager.'

Carl Sagan[28]

According to NASA´s project official description, the Golden Record is a phonograph record made of gold-plated copper disk (Fig. 10.[29]). The message contents were *"selected to portray the diversity of life and culture on Earth*[30]*"*. Not only the schematic drawings and explanatory schemes were put on Voyagers but more. The GR consists of following relatively independent parts:

- Scenes from Earth - 118 images and diagrams about our species and our planet (including basic mathematical, chemical and physical definitions)[31]
- Greetings from Earth - spoken greetings from Earth-people in fifty-five languages and printed messages from President Jimmy Carter and U.N. Secretary General Waldheim
- Music from Earth- musical selections from different cultures and eras (27 audio recordings of Eastern and Western classics and a variety of ethnic music)
- Sounds of Earth- variety of natural sounds (21 audio recordings of human activities, machines and natural phenomenon)

The GR was intended to be a comprehensive description of the nature, people,

and culture. Pictures, voices, greetings, and music were added to represent the diversity of life. The very characteristic of the GR was described by Sagan: "*a kind of time capsule, intended to communicate a story of our world to extraterrestrials"*[32]. This ambitious project intended to write down a story about human beings – about its life, feelings, evolution, environment, science, progress, and culture (Sagan, 1998).

As previously foreshadowed on many places, the central person of the ET search scientific project was the American astronomer Carl Sagan of Cornell University. It is no surprise, that the record contents were created and assembled for NASA by a committee chaired by Sagan (who earned the position of executive producer of the Voyager Interstellar Record) and the scientific team: F. Drake, A. Druyan, T. Ferris, J. Lomberg, L. Salzman Sagan. International consultations have taken place to accomplish the objective. We met Drake already as Sagan's co-worker from Arecibo Message. The cooperation continued during the preparation of the VM. Drake is author of some diagrams from visual part, specifically of mathematical definitions. Another Sagan's collaborator, Jon Lomberg works as the designer of visual presentations and artist representations, created the record's diagrams[33.] Not only labour relations were present in this team. Linda Salzman Sagan was wife of Carl Sagan, created the representation of earthling's pair on both Pioneers and Voyagers. Not only the composition of the scientific team but also the time pressure but seems to be an important factor that shaped the contents of the VR. The team had weeks only to compile the message contents.

We should not forget to take into consideration another ever-present factor: NASA and public relations and the NASA corporate efforts to draw and to keep the interest in space program. As Havel (1998) referred to Pioneer Program, the message of the plaque had also another ambiguous meaning – more money for science. It is logical to presuppose that the interest of public and mass media for space exploration program was decreasing after the victorious conquest of the Moon. Controversial yet interesting topic might captivate the public interest and to increase the support of government for NASA annual budget. Moreover, publicity includes the support of public and possible funding increase. However, the public were not informed about the final contents of the VR until the moment the Voyager´s were safely put on the orbit. This silence about the table of contents was resulted by the former public

displeasure with the Pioneer plaque. Sagan also explained that another reason were the copyright restrictions[34].

In following two chapters, we will have a closer look on both visual and audio parts of the GR. We do not have any sufficient information that there was an intention to link the sounds directly to the pictures within the GR data frame and there is no direct cross-references between its two parts. The understanding is on the imagination and abilities of the recipients. The same counts for us.

7. GOLDEN RECORD - VISUAL PART

"But the way to discourage hostile extraterrestrials from visiting Earth is not to describe how unpleasant or dangerous our planet is, because they are unlikely to be happy about the prospect of unpleasant or dangerous beings poking around the galaxy."
Sagan (1986: Nov.)

Before entering on the subject of the following two chapters, a brief summary should be made. The GR has a twofold composition and its assembly communicates a *"story of our world"*. In other words, the GR is a visual and audio profile of human life on planet Earth. There are obvious conceptual links to Arecibo and Pioneer messages. From the AM steams the idea of numerical and mathematical base for interstellar communication. Except for the diagram of the position of our Sun relative to fourteen pulsars, the model of hyperfine transition of neutral hydrogen was adopted from Pioneer plaque. Samuels mentioned (in: Battaglia 2005) when comparing the GR to the preceding projects, that *"the Voyager record contains multiple media and much more than science"*. Samuels's assertion is founded also in Sagan's short notice in his book *Cosmos* (1998). Sagan highlighted here that the mission objective was not to send exclusively scientific information. Instead, the message contents ought to describe the uniqueness of humans. Regardless of how ambitious the plan was, Sagan admitted that the most of the message would be probably indecipherable (Sagan, 1998).

7.1. DESCRIPTION

The visual part is an imaginative description of nature and life, arranged as a 'slide show'. Sagan mentioned that the visual documentation appears more like a picture gallery of people from all around the world. This photo-album emphasizes especially human activities e.g., care for other humans, tools production, constructions, creation of objects of art, and responses on challenges. The visual part consists of 116 pictures in total out of which 17 are descriptive, black and white, two-dimensional diagrams created by the scientific team; the rest consists of coloured photographs picked up from various sources (UN, NAIC, NASA). An important characteristic of the GR pictures is the use of explanatory mathematical

definitions or chemical formulas. The authors inserted the explanatory symbols directly into the given picture. Similarily, some of them are also marked with number that shows its numerical order.

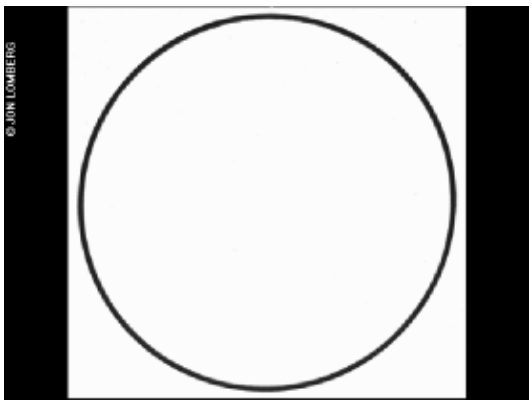

Fig. 11.: Calibration circle, Jon Lomberg

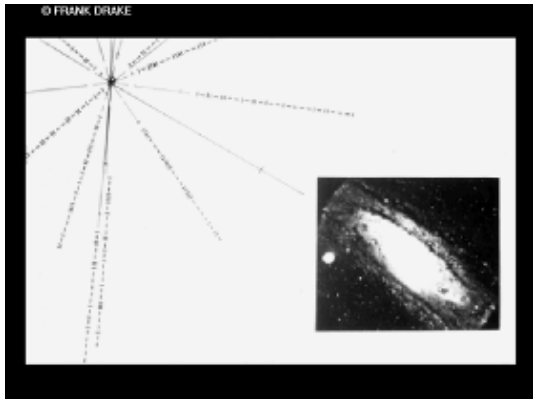

Fig. 12 .: Solar location map, Frank Drake

The succession of pictures follows logical sequence from *"Calibration circle"* (Fig. 11.) that represents the shape of the record itself. This the encouraging sign that the message was decoded properly as indicated on the cover diagram is followed by the second picture that explains the location of Solar System in the Galaxy (Fig. 12.). The location radial diagram refers not only to the engravings on the message cover (on the IE) but as was pointed above also to the PM. Pictures number 3. and 4. of the GR define the basic mathematical and physical units (please see Fig. 21. and Fig. 22.) and were created by Frank Drake. The visual exhibition of Solar System objects (Sun, Mercury, Mars, Jupiter, and Earth) includes also the *"Solar spectrum."* Subsequent to the astronomical compilation is the chemical units' definition (elements C, N, H, O, P); and two pictures of the DNA structure (double helix and magnified) created by Jon Lomberg. Microscopic picture of cells and its division is followed by twenty images that describe human life on planet Earth. These pictures document human anatomy, reproduction, and procreation (we will analyze this subpart in detail in Chapter 9: Life Creation – The Voyager Story). Succeeded to the life section are five pictures of humans in context to other humans (family, groups). It consists of five items – *"Nursing mother"*, *"Father and child"*, *"Group of Children"*, *"Diagram of family ages,"* and *"Family portrait."* We can observe directly the link between the last two given pictures. The silhouettes of persons from a photo (Fig. 14.) were used as a model for the explanatory diagram (Fig. 13.). As we can clearly see, the age and weight are specified using the mathematical legend:

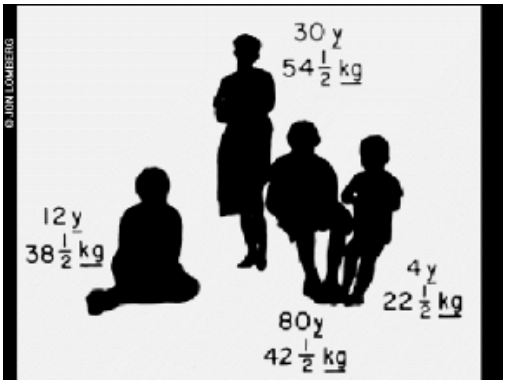

Fig. 13.: Diagram of family ages, Jon Lomberg

Fig. 14.: Family portrait, Nina Leen, Time, Inc.

Many more pictures include the legends describing the scales and measures – distance, length, height, size, weight etc. Directly behind the family photo follows the representation of continental drift as it proceeded with time: the past, present and future position of continents (Fig. 40.). This diagram opens the documentary presentation of the natural world and the environment: island, sea, river, mountains, desert, rock, forest, trees (obviously very important, four original pictures), and leaves (Fig. 38. and Fig. 39.). The human place and activities in the nature was portrayed here e.g., the lighthouse on photo of seashore, the equestrian on the picture of sand dunes, the shepherds in Monument Valley. Picture of *"Flying insect with flowers"* opens the animal life section along with the diagram of evolution (Fig. 15.). This diagram draws our attention for one more reason. At the top of evolution process, the male-female figures were placed. Here we meet again the same pair that was displayed on Pioneer plaque but on attached diagram the female representative of humankind salutes the recipient. Coloured photos of dolphin, fishes, frog, crocodile, eagle represents the biological diversity on Earth. The biodiversity is the result of the long process of evolution and so the link between the realms of humans and animals are represented on the evolutionary process diagram (Fig. 15.) or Fig. 39.). The affinity

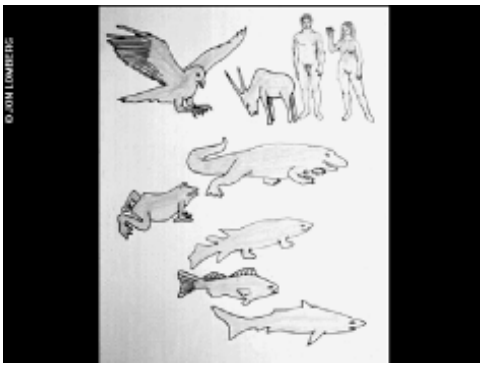

Fig. 15.: Diagram of vertebrate evolution, Jon Lomberg

Fig. 16.: Tree toad, Dave Wickstrom

and contact between humans and animals show several pictures (Fig. 16., Fig. 39. of this work), e.g. *„School of fish"* (with diver), and *"Jane Goodall and chimps"*.

So far, we have seen that the VM works with both microscopic (cells, DNA) and with macroscopic (objects of Solar System) levels of presentation. Several pictures of the GR slide show also contain the mathematical explanations of the spatial categories (size, distance). The three-dimensional aspects ratio that specifies the spatial correlation of objects in our world is presented on few pictures. As Havel (1998) objected this factor was not respected on the Pioneer plaque, where only two-dimensional illustrations were presented[35]. On attached pictures of hunting scene, we can observe directly how symbols explain the events and how the three-dimensional aspects ratio (perspective) was described. Again, the silhouettes of persons from a photo (Fig. 18.) were used as a model for the explanatory diagram (Fig. 17.):

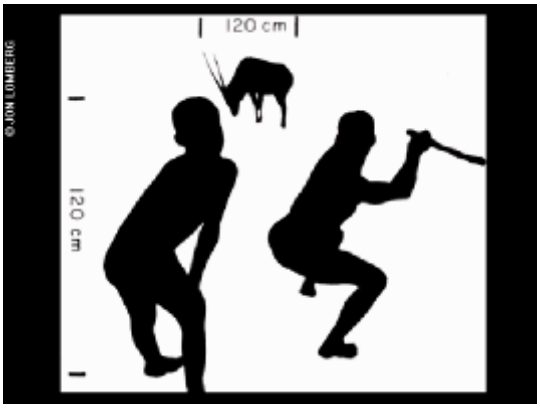

Fig. 17.: Sketch of bushmen, Jon Lomberg

Fig. 18.: Bushmen hunters, R. Farbman, Time, Inc.

Attached photo of Bushmen unlocks the picture gallery of peoples from all around the world. We see faces of people from Guatemala, Bali, Thailand, and Turkey and theirs activities. Not only hunting, working, dancing, climbing, and exercising (performance by *"Gymnast"*), running (*"Sprinters"*, Fig. 19.) is portrayed on these pictures, but also teaching, learning, fishing, cooking, shopping at the supermarket, eating dinner in China. One separate photo shows the demonstration of licking, eating, and drinking (made by NAIC).

Pictures usually show contacts among people (dinner, schoolroom, *"Children with globe"* Fig. 20.) or their interactions with the environment and animals (harvest, fishing) and its context to nature (another scene with diver and fish, walking in the

forest). The meanings of these pictures are multiple and its context broad and it is therefore impossible to divide these photos into strictly divided parts. The basic distinction we use is grounded in the binary opposites of 'nature' (natural) and 'technology' (artificial).

Fig. 19.: Sprinters (Valeri Borzov of the U.S.S.R. in lead). History of the Olympics, Picturepoint, London

Fig. 20.: Children with globe, UN

Section dedicated to persons in motion fluently goes to the description of buildings and structures. The photo of the *"Great Wall of China"* (the human-made structure observable from the orbit of Earth) is followed by house constructions in Africa and Amish Country, and by images of finished house (American) and its interior. Not only the buildings like Taj Mahal and the UN center both in daylight and at night, but also cities were incorporated into the GR´s photo gallery: Oxford and Boston. The photo of Opera House in Sydney, the demonstration of modern architecture opens the technical part.

Story about engineering and technology starts with photos of artisan with drill, factory filled with machines, X-ray of hand, and a woman with a microscope. Important part of the GR compilation are the means of transport and transportation network - traffic jam (from India), highway, jet fighter, train, Titan spacecraft (the space booster rocket of both Voyagers), airports, and bridge. The communication engineering was not left out –the photo of Arecibo Telescope (Fig. 44.) was placed on the GR together with photos of radio telescopes from Netherlands.

Closing moments of the visual presentation are dedicated to photos of *"Page of book"* (System of the World by Isaac Newton), *"Astronaut in space"*, *"Sunset with birds"*, and *"String Quartet (Quartetto Italiano)"*. The very last picture of the GR visual part is the *"Violin with the music score"*. The photo of musical sheet of Cavatina by Ludwig van Beethoven closes the visual part and opens the acoustic anthology. There are more links between visual and audio parts. We will show them in the following chapter.

To sum up, the GR contains basic mathematical definitions (for more please see Chapter 10), lesson in astronomy, descriptive anatomy and organic chemistry. The schematic overview of basic definitions is offered in a diagram form. The GR comprises the environment, landscapes, natural world, flora and fauna, and humans. Not only shows it activities and contact to other humans, but also the structures: buildings, machines, technology, and networks. The use of photo documents (pictures, photos) allows displaying the context of nature and life on planet Earth and interactions among it.

7.2. COMMENTS

We have seen that the variety of life was described by variety of representations: diagrams, photos, and explanatory legends implanted into the pictures. An allegoric parable of museum may be useful to describe another aspect of GR. Let us suppose that we have just finished a visit of museum that exhibits colourful photo and cultural artefacts. The collection originates from various, yet not recognised, places and cultures. The 'legends' were attached to the pictures to describe places of origin, dates, sizes, and quantity. At the end of the exhibition, the visitor may be fascinated by the wonderful diversity of nature and cultures and feel and enthusiasm about the extent of the exhibition. The visitor many think that the museum contains sufficient amount of information about the world. For us now, it is essential to distinguish between the allegoric 'collection' and 'legends' in order to answer our first research question for what the Voyager message contains. The museum exhibits and the collection were described in chapter above and soon it will be amended with musical accompaniment. Now let us to elaborate the allegoric parable of museum further.

First, the GR compilation itself is not extensive enough (116 in total), inevitably were many 'photo exhibits' left in the museum depository. In spite of the number of pictures, the arrangement of individual parts within a slide show as a whole is harmonious and balanced. To fulfil the demand on complete description of the GR, the short note on what was missed out is necessary. Since the GR does not contain any relevant piece of information about the fundamental fact of life – the death, the VM paradoxically cannot claim itself to be a complete story of life. Similarly, it does not contain negative characteristics of humanity. The better part of humankind was demonstrated in favor to perform *"A hopeful rather than a despairing view of humanity and its possible future"* as Sagan explained (1986: Nov.). Moreover, there is one great point that seems to be worth noticing. The religions or religious life had been entirely excluded from human story. These objections only go to show that not every aspect of humanity had been placed on the GR.

Having a detailed look at the photo documentation, we may presuppose that the axiological concept of culture offers the suitable description of the GR totality. The continuous non-problematic totality as displayed on the GR expresses only *"positive values, which concerned cultivation and humanization of humans in order to fulfil the progressive development of human society"*[36] (Soukup, Prague 2000). We assume that this concept of culture gives another expression to an unspecified term

"culture on Earth" that was announced in the mission assignment *"to portray the diversity of life and culture on Earth*[37]*."*

Secondly, an important characteristic of the story of humanity is the obvious ascending tendency. The logic of the pictorial slide show goes from the basics to the diversity, from the wild nature to high technology. The GR´s documents arrangement assigns linear understanding the time. The problem of time perception was described by Bloch (1977) who highlighted the differences in understanding the time in various cultures. The Western understanding the time as linear is one of conventions that are not necessarily valid all around the planet. Bloch mentioned for example Geertz´s study on Balinese concept of time and calendared system. Geertz discovered the varieties in actual day length that implies the different concept of duration and flexible units of time. Let us also add that the cyclical conception of time was illustrated by Sahlins (1981) in his interpretation of the death of Captain Cook on Hawaii Islands. Not only is the linearity of time typical for Western sociocultural area but also for the GR. Moreover, the time-period measurement is explained using the period associated with the fundamental transition of the hydrogen atom that provides the basic clock-reference. That leads us to the third argument.

> Finally third argument: not only the diagrams but also the constant companion of several definitions (mathematics, chemical formulas as conventional designations) shows the preference of one understanding and describing the world. The images were used not only to convey pictorial information but also to explain and interpret. Using Latour distinction among concepts of cultures, it would be incorrect to assume that the GR sequence expresses cultural relativism or anthropological symmetry (Latour, 2004). Metaphorically speaking, we must address our focus on the authors of 'legends' to see that only one dominant understanding the world was applied to communicate the story about humans and nature. It appears to us that the particular universalism (Latour) offers us the appropriate explanation of the concept of culture expressed on the GR. According to this theory, one predominant culture controls the access to nature. This exclusive position is also the source of differences between this predominant culture and the world of the others. The dominating culture also claims the right to the monopoly description of the nature. When we apply Latour´s distinction to our museum allegory, it is clear to us that this predominant culture wrote the description accompanying the illustrations, the 'legends.'

> We can distinguish now between the two divergent tendencies within the VM data frame. The GR contains the self-representation and the others-representation. The GR compilation emphases the cross-cultural focus in which various peoples are documented and contrasted. The self-representation as the prevailing point of view influenced not only the communication channels but also the contents of the story about life. The totality of world was described in terms of science, technology, and development following simple purpose: to make it understandable to any intelligent (understand: scientific being). Our first premise is that the meaning of allegoric 'legends' attached to the photos were influenced by scientific understanding the world.

This understanding also influenced the very appearance of the GR as a slide show. Above, in Chapter 5. we have outlined the importance of sci-fi genre. Kirby (2003) studied the magnitude of visual representation within science and the cooperation between scientific consultants and fictional filmmakers. For us the

"social component in the production of scientific knowledge" seems to be crucial when analysing the GR pictographic sequence. Kirby mentions that except for documentaries the *"science consultants use fictional films as promotional devices for their research fields"* and continues with his analysis. The notes on documentaries are inspiring for us in many respects. First, documentaries are the visual display and recognition of outcomes of science. Documentaries employ the visual manner of representing the knowledge to offer the interpretation of reality. In this respect, the GR is the *"virtual witnessing"* (Kirby, 2003), the promotional device of science. The documentary evidence of life on planet Earth that was performed by the GR and in this sense we obtained another expression of what we have defined as the 'exhibits'.

7.3. SUPPLEMENT

Complete list of pictures is as follows.
Sources: http://voyager.jpl.nasa.gov/spacecraft/sceneearth.html
Accessed: December 18, 2006

7.3.1. Scenes from Earth

1. Calibration circle, Jon Lomberg
2. Solar location map, Frank Drake
3. Mathematical definitions, Frank Drake
4. Physical unit definitions, Frank Drake
5. Solar system parameters, Frank Drake
6. Solar system parameters, Frank Drake
7. The Sun, Hale observatories
8. Solar spectrum, National Astronomy and Ionosphere Center, Cornell University (NAIC)
9. Mercury, NASA
10. Mars, NASA
11. Jupiter, NASA
12. Earth, NASA
13. Egypt, Red Sea, Sinai Peninsula and the Nile, NASA
14. Chemical definitions, Frank Drake
15. DNA Structure, Jon Lomberg
16. DNA Structure magnified, light hit, Jon Lomberg
17. Cells and cell division, Turtox/Cambosco
18. Anatomy 1, World Book
19. Anatomy 2, World Book
20. Anatomy 3, World Book
21. Anatomy 4, World Book
22. Anatomy 5, World Book
23. Anatomy 6, World Book
24. Anatomy 7, World Book
25. Anatomy 8, World Book
26. Human sex organs, Sinauer Associates, Inc.

27. Diagram of conception, Jon Lomberg
28. Conception, Albert Bonniers; Forlag, Stockholm
29. Fertilized ovum, Albert Bonniers; Forlag, Stockholm
30. Fetus diagram, Jon Lomberg
31. Fetus, Dr. Frank Allan
32. Diagram of male and female, Jon Lomberg
33. Birth, Wayne Miller
34. Nursing mother, UN
35. Father and daughter (Malaysia), David Harvey
36. Group of children, Ruby Mera, UNICEF
37. Diagram of family ages, Jon Lomberg
38. Family portrait, Nina Leen, Time, Inc.
39. Diagram of continental drift, Jon Lomberg
40. Structure of Earth, Jon Lomberg
41. Heron Island (Great Barrier Reef of Australia), Dr. Jay M. Pasachoff
42. Seashore, Dick Smith
43. Snake River and Grand Tetons, Ansel Adams
44. Sand dunes, George Mobley
45. Monument Valley, Shostal Associates, Inc.
46. Forest scene with mushrooms, Bruce Dale
47. Leaf, Arthur Herrick
48. Fallen leaves, Jodi Cobb
49. Snowflake over Sequoia, Josef Muench, R. Sisson
50. Tree with daffodils, Gardens Winterthur, Winterthur Museum
51. Flying insect with flowers, Borne on the Wind, Stephen Dalton
52. Diagram of vertebrate evolution, Jon Lomberg
53. Seashell (Xancidae), Harry N. Abrams, Inc.
54. Dolphins, Thomas Nebbia
55. School of fish, David Doubilet
56. Tree toad, Dave Wickstrom
57. Crocodile, Peter Beard
58. Eagle, Donona, Taplinger Publishing Co.
59. Waterhole, South African Tourist Corp.
60. Jane Goodall and chimps, Vanne Morris-Goodall
61. Sketch of bushmen, Jon Lomberg
62. Bushmen hunters, R. Farbman, Time, Inc.
63. Man from Guatemala, UN
64. Dancer from Bali, Donna Grosvenor
65. Andean girls, Joseph Scherschel
66. Thailand craftsman, Dean conger
67. Elephant, Peter Kunstadter
68. Old man with beard and glasses (Turkey), Jonathon Blair
69. Old man with dog and flowers, Bruce Baumann
70. Mountain climber, Gaston Rebuffat
71. Gymnast, Philip Leonian, Sports Illustrated
72. Sprinters (Valeri Borzov of the U.S.S.R. in lead), History of the Olympics, Picturepoint, London
73. Schoolroom, UN
74. Children with globe, UN
75. Cotton harvest, Howell Walker
76. Grape picker, David Moore
77. Supermarket, NAIC
78. Underwater scene with diver and fish, Jerry Greenberg
79. Fishing boat with nets, UN
80. Cooking fish, Cooking of Spain and Portugal, Time-Life Books
81. Chinese dinner party, Time-Life Books
82. Demonstration of licking, eating and drinking, NAIC
83. Great Wall of China, H. Edward Kim
84. House construction (African), UN
85. Construction scene (Amish country), William Albert Allard
86. House (Africa), UN

87. House (New England), Robert Sisson
88. Modern house (Cloudcroft, New Mexico), Frank Drake
89. House interior with artist and fire, Jim Amos
90. Taj Mahal, David Carroll
91. English city (Oxford), C.S. Lewis, images of His World, William B. Eerdmans Publishing Co.
92. Boston, Ted Spiegel
93. UN Building Day, UN
94. UN Building Night, UN
95. Sydney Opera House, Mike Long
96. Artisan with drill, Frank Hewlett
97. Factory interior, Fred Ward
98. Museum, David Cupp
99. X-ray of hand, NAIC
100. Woman with microscope, UN
101. Street scene, Asia (Pakistan), UN
102. Rush hour traffic, India, UN
103. Modern highway (Ithaca), NAIC
104. Golden Gate Bridge, Ansel Adams
105. Train, Gordon Gahan
106. Airplane in flight, Frank Drake
107. Airport (Toronto), George Hunter
108. Antarctic Expedition, Great Adventures with the National Geographic
National Geographic
109. Radio telescope (Westerbork, Netherlands), James Blair
110. Radio telescope (Arecibo), NAIC
111. Page of book (Newton, System of the World), NAIC
112. Astronaut in space, NASA
113. Titan Centaur launch, NASA
114. Sunset with birds, David Harvey
115. String Quartet (Quartetto Italiano), Phillips Recordings
116. Violin with music score (Cavatina), NAIC

8. GOLDEN RECORD - AUDIO PART

"Greetings from a human being of the Earth. Please contact."
(translation of the greeting in Gujarati language, the GR)

8.1. DESCRIPTION

The first section of GR´s audio part assembles twenty-one sounds recordings: *"Sounds of Earth"*. The total playing time is nearly 13 minutes of various sounds. Similarly to the picture sequence the sounds compilation follows the chronological order and respect the historical perspective. According to Sagan (1998), some of these sounds had been present on Earth since prehistoric times. Samuels (in: Battaglia 2005) described the acoustic representation of GR as *"a soundscape suite evoking the evolution of life on Earth"*.

The noises of volcanoes, earthquake, thunder, mud pots and atmospheric wind, rain and surf correspond to natural phenomena. The record includes also sounds uttered by animals: frogs, elephant, and chimpanzee, howling of hyena, barking of tame dog, and singing of birds. Some of the named animal species were portrayed in the visual part. The evolutionary human symphony opens with the first tools beat and continues in sounds of blacksmith, sawing, and sheep herding. The human activity of the advanced ages is represented by regular and artificial sounds of horse and cart, tractor, riveter, ship, train, bus, auto, F-111 Flyby, Saturn 5 Lift-off, and Morse code. Sounds of footsteps, heartbeat, laughter, fire, speech, sound of kiss, mother talking to a child (in English of course) are documents about human life on planet Earth. Last soundtrack contains the recording of electrical activity of human brain that was transferred to sound – described as "*life sings"* (Sagan, 1998).

When comparing the sounds to pictorial compilation we see there is a linkage between those two parts. For example, the sound of chimpanzee refers to the photo of Jane Goodall with chimpanzee; rumbling noise of the train refers to the image of train. At the other hand, the most of sounds is emblematic e.g., *"First Tools"* or almost mysterious *"Music of the Spheres"*, with it's meaning unexplained and obscure.

Spoken reports by representatives from our planet – *"Greetings from Earth"* - contains fifty-five greetings in different languages and one in *"whale language"*. The total time of greetings recording is about four minutes. The shortest recording takes only one second – "Hi!" greeting. The longest greeting is in Gujarati language and it takes 15 seconds. There was no careful choice behind the greetings composition; the selection was haphazard without having regard to either speaker's accent or dialects (Samuels, in: Battaglia 2005). NASA described the random selection of the greetings: *"Many of the speakers were from Cornell University and the surrounding communities. They were given no instructions on what to say other than that it was to be a greeting to possible extraterrestrials and that it must be brief."* [38] Not only were the speakers chosen randomly but also the oral communications have no fixed structure; each greeting has its inherent characteristics, possibly expressing also the common greeting formulas of given language. Some of the greetings are recipient oriented. For example:

English	*"Hello from the children of planet Earth."*[39]
Czech	*"Dear Friends, we wish you the best."*
Amoy (Min dialect)	*"Friends of space, how are you all? Have you eaten yet? Come visit us if you have time."*
Latin	*"Greetings to you, whoever you are; we have good will towards you and bring peace across space."*

Certain attention ought to be paid to the greeting in the whale language. Although the whale songs belong with the animal realm, it was incorporated directly into the language section. This attracts our interest because it reflects on the interspecies communications issue, and as commented by Samuels (in: Battaglia 2005) it *"offers an important insight into the mind-set of the members of the committee working on this project and an important caveat to the group's dedication to the centrality of mathematics as the basis of communicative intent"*. Into this section belong the greetings from the Secretary General of the UN General Kurt Waldheim and one track compiled from the UN representatives greetings, the recording is unexpectedly finished by the "whale greeting". Also the U.S. president Jimmy Carter added his greeting although only a printed version was attached to the GR.

Alike the visual slide show, also the third audio compilation, *"Music from Earth"*

was intended to offer the auditorium multiple selections. Twenty-seven tracks perform nearly ninety minutes of music. The factors that affected the music choice were described by Samuels (in: Battaglia 2005): *"In this, as in many decisions regarding the musical selections, competing questions of globalism, nationalism, humanism, science, and culture were solved in part by an appeal to authenticity: Miles Davis's version of 'Summertime", or Louis Armstrong's 'Melancholy Blues"? (Armstrong) .... Beethoven and Bach were argued to represent, in some sense, the most authentic version of the Western classical music tradition and the culture from which it had sprung.*"

The musical performances on the GR include western classical 'the best of' collection, very popular rock-and-roll songs, and native music typical in various geographical areas. Taken as a whole, the Western world music compilation meets the high standards requirements not only on quality of music (Queen of the Night aria by Mozart, Fifth Symphony by Beethoven, Brandenburg Concerto by Bach) but on the reputation of interpreters and conductors (Gould, Moser, Richter, Stravinsky). The Western composers treated with partiality were Johann S. Bach (three tracks) and Ludwig van Beethoven (two tracks).

Native music selection produces a melodic set; the audience were offered Aborigine songs, Azerbaijan bagpipes, Georgian chorus, percussion from Senegal, Pygmy girls' initiation song from Zaire, Night Chant by Navajo Indians, music from Java Mexico, New Guinea, Japan, Bulgaria, China, and India with contents of the lyrics untranslated. To Beethoven not only last picture but also the last recording Cavatina[40] was dedicated

8.2. COMMENTS

"The importance of music as a form of communication
can be sensed in the fact that the Voyager disc itself, and
the book that chronicles the making of it, is dedicated
'To the makers of music – all worlds, all times.'"
(Samuels, in: Battaglia 2005)

The three previously described sections: sounds, voices, and music of audio part have also certain undertones. Samuels described the implicit meaning of every attempt to communicate (in sci-fi as well as in science) as a belief there is a "*shared universe of semantic concept"*. This assertion is based on evidence par excellence, the hydrogen transition concept. This presupposed condition of interstellar communication specifies the level of knowledge as a condition that has to be met to make such a communication possible. Alternatively, the ability to achieve this knowledge is a logical result of both

biological (brain functions) and scientific (technology) evolution. All above-mentioned reasons show clearly that intellectual development, the ability of conceptual thinking, and "*communicative transparency"* are for the interstellar communication the matter of principle. However, these concepts are not as universal as it might seem. It is hardly true that the transition of molecular hydrogen counts for universal and understandable information in intercultural or cross-cultural (or generally terrestrial) context.

In the audio part of GR, music and sound were presented as an act of communication that also shows numerical regularity (wave pattern). The interstellar hit parade not only carries the label of origin 'made in NASA' but at the same time it articulates the belief there is a mathematical harmony enciphered in music. According to Samuels (in: Battaglia 2005) is the *"communicative transparency is the clearest marker of technological or cultural superiority."* It seems now, that the "*communicative transparency"* is along with development of science another important prerequisite of interstellar communication and therefore the fundamental concept behind the VM.

It is of the highest importance to gain a clear insight into the means of communication used. The wide range of suggested *"shared codes"* (Samuels, in: Battaglia, 2005) were displayed in the GR. Not only the visual presentation, spoken languages (articulated sounds), and music but also the human literacy in form of printed greeting is a part of the GR. Except for that, the GR contains various sounds either of natural character (sea waves) or from artificial sources (train), including Morse code – another international and universal code of communication. Hence, it is not surprising that the language section includes also Latin. Although it is considered the dead language, it remains the language of intellectuals. The audio portion is another possible channel of communicating for it transmits information, and likely it is supposed to be another of "shared codes".

We may presume now that the VM includes a variety of communication channels to offer the explanation and interpretation of reality. More and more the GR seems to us to be an interstellar multimedia encyclopaedia edited by a group of people, accurately by the scientific team, who were given the privilege to speak for all. The sufficient amount of evidence was collected to prove there is (were) life on Earth. However, there is one guiding principle: the mathematics as an ever-present prominent aspect of such a communication channels and at the same time the universal medium for transmission the

information, or the *"common tongue"* (Samuels, in: Battaglia, 2005).

8.3. SUPPLEMENT

Complete list of audio recordings is as follows.
Sources: http://voyager.jpl.nasa.gov/spacecraft/sounds.html
http://voyager.jpl.nasa.gov/spacecraft/languages/languages.html
http://voyager.jpl.nasa.gov/spacecraft/music.html
Accessed: December 18, 2006

8.3.1. Sounds of Earth

- Music of The Spheres
- Volcanoes, Earthquake
- Thunder
- Mud Pots
- Wind, Rain, Surf
- Crickets, Frogs
- Birds, Hyena, Elephant
- Chimpanzee
- Wild Dog
- Footsteps, Heartbeat,
- Laughter
- Fire, Speech
- The First Tools
- Tame Dog
- Herding Sheep, Blacksmith, Sawing
- Tractor, Riveter
- Morse Code, Ships
- Horse and Cart
- Train
- Tractor, Bus, Auto
- F-111 Flyby, Saturn 5 Lift-off
- Kiss, Mother and Child
- Life Signs, Pulsar

8.3.2. Greetings from Earth

Sumerian, Arabic, Urdu, Italian, Ila (Zambia), Akkadian, Romanian, Hindi, Nguni, Nyanja, Hittite, French, Vietnamese, Sotho, Swedish, Hebrew, Burmese, Sinhalese, Wu, Ukrainian, Aramaic, Spanish, Greek, Korean, Persian, English, Indonesian, Latin, Armenian, Serbian, Portuguese, Kechua, Japanese, Polish, Luganda, Cantonese, Dutch, Punjabi, Nepali, Amoy (Min dialect), Russian, German, Turkish, Mandarin Chinese, Marathi, Thai, Bengali, Welsh, Gujarati, Kannada, Telugu, Oriya, Hungarian, Czech, Rajasthani.

8.3.3. Music from Earth

- Bach, Brandenburg Concerto No. 2 in F. First Movement,
  Munich Bach Orchestra, Karl Richter, conductor. 4:40
- Java, court gamelan, "Kinds of Flowers,"
  recorded by Robert Brown. 4:43
- Senegal, percussion,
  recorded by Charles Duvelle. 2:08
- Zaire, Pygmy girls' initiation song,
  recorded by Colin Turnbull. 0:56
- Australia, Aborigine songs, "Morning Star" and "Devil Bird," recorded by Sandra LeBrun Holmes. 1:26
- Mexico, "El Cascabel,"
  performed by Lorenzo Barcelata and the Mariachi México. 3:14
- "Johnny B. Goode",
  written and performed by Chuck Berry. 2:38
- New Guinea, men's house song,
  recorded by Robert MacLennan. 1:20
- Japan, shakuhachi, "Tsuru No Sugomori" ("Crane's Nest"), performed by Goro Yamaguchi. 4:51
- Bach, "Gavotte en rondeaux" from the Partita No. 3 in E major for Violin, performed by Arthur Grumiaux. 2:55
- Mozart, The Magic Flute, Queen of the Night aria, no. 14.,
  Edda Moser, soprano. Bavarian State Opera, Munich, Wolfgang Sawallisch, conductor. 2:55
- Georgian S.S.R., chorus, "Tchakrulo",
  collected by Radio Moscow. 2:18
- Peru, panpipes and drum,
  collected by Casa de la Cultura, Lima. 0:52
- "Melancholy Blues",
  performed by Louis Armstrong and his Hot Seven. 3:05
- Azerbaijan S.S.R., bagpipes,
  recorded by Radio Moscow. 2:30
- Stravinsky, Rite of Spring, Sacrificial Dance,
  Columbia Symphony Orchestra, Igor Stravinsky, conductor. 4:35
- Bach, The Well-Tempered Clavier, Book 2, Prelude and Fugue in C, No.1. Glenn Gould, piano. 4:48
- Beethoven, Fifth Symphony, First Movement, the Philharmonia Orchestra, Otto Klemperer, conductor. 7:20
- Bulgaria, "Izlel je Delyo Hagdutin",
  sung by Valya Balkanska. 4:59
- Navajo Indians, Night Chant,
  recorded by Willard Rhodes. 0:57
- Holborne, Paueans, Galliards, Almains and Other Short Aeirs, "The Fairie Round," performed by David Munrow and the Early Music Consort of London. 1:17
- Solomon Islands, panpipes,
  collected by the Solomon Islands Broadcasting Service. 1:12
- Peru, wedding song,
  recorded by John Cohen. 0:38
- China, ch'in, "Flowing Streams",
  performed by Kuan P'ing-hu. 7:37
- India, raga, "Jaat Kahan Ho",
  sung by Surshri Kesar Bai Kerkar. 3:30
- "Dark Was the Night",
  written and performed by Blind Willie Johnson. 3:15
- Beethoven, String Quartet No. 13 in B flat, Opus 130, Cavatina, performed by Budapest String Quartet. 6:37

9. LIFE CREATION - THE VOYAGERS STORY

In previous chapters, we have discussed some of the characteristics of the GR and objections, which may be argued against the message contents. We have seen another prove that the attempts to communicate are linked together not only in conceptual but even in principial aspect ratio. We have foreshadowed the idea that the GR more than cultural perspective projects the human reason and conceptual thinking (cogito) expressed in terms of contemporary western science, and uses mathematics as an universal channel of communication. The analysis posed our second research question for the communication channels of science.

Now our task is to work out what precisely we mean by saying 'scientific point of view', and what this specific point of view in detail entails. Harding (1991) suggested another definition of this specific viewpoint: *"What is at issue for all these critics, including feminists, is not only the easily identifiable theories, methods, institutions, and technological consequences of the science but also something harder to describe: Western scientific world view of mind-set."* Since the composition of the GR makes an interdisciplinary effort and since the GR contains variety of media and representations, is *"mind-set"* as defined by Harding an important designation.

What is the concept embedded into the VM? Havel (1996) pointed out that the senders of the VM expected not only the sensory equipment to perceive the message, but also the curiosity. This curiosity, an intellectual potential, is the basic condition for the awakening of interest of the recipient in the message itself. Not only to accept it passively, but also to expend energy on the IE inscription deciphering, phonograph assembly, etc. With this in mind, it seems useful to us to attempt to define intellectual development premise the as the pattern of the message.

Historian of science, Kuhn (1997) in his revolutionary study *Structure of Scientific Revolutions* stated that science performs the *"riddle solving"*. Except for assuming there are problems to solve, the scientists practice the proper procedures and conduct the systematic investigation to establish facts. An orderly logical arrangement of the research is necessary – the scientific method. The results have to fit the existing (or prevailing) theories and have to be reproducible and verifiable. As Kuhn has shown, the network of conceptual, theoretical, instrumental, and methodological obligations guarantees the validity and applicability of those regulations.

We may state now that the terms *"riddle solving"* (Kuhn, 1962), *"problem-solving approach"* (Samuels, in: Battaglia 2005), and intellectual *"curiosity"* (Havel, 1996) describe the conceptual framework of the VM. The condition of the ability to

communicate the story was imposed on a civilization (Samuels, in: Battaglia 2005), together with another implicit assumption: the technological development. Therefore, only an advanced civilization that also evolved a science is the addressee of the GR. In this respect we deal with the cosmic reflection of us, the projection of terrestrial concepts and values.

However, we must be extremely cautious in concluding that the conceptual thinking capability, or *"mind-set"* can be applied on the humankind equally for it has been produced by Western sociocultural area and for it is a result of education and training. Moreover, from sociocultural perspective is this viewpoint a local issue although globally predominant. As Harding (1991) specified the Western area: *"we live in a scientific culture, to be scientifically illiterate is simply to be illiterate."*

9.1. COMMON LANGUAGE

The central component of the GR is the demonstration of the *"scientific literacy"* – the basics from mathematics, physics, astronomy, biology, genetics, anatomy, and possibly sociology. To give a few instances to illustrate the scientific information that also expresses the *"mind-set"*, we use several pictures from the GR.

The illustration of the mathematical definitions is a good one, because it shows us clearly the premise that there is one language in common in the universe, or *"shared concept"* present. To this privileged position of mathematics attributes also the fact that the mathematical unit definitions (Fig. 21.) were placed at the very beginning of the visual sequence (numbers 3 and 4 of GR´s numerical order) and that mathematical definitions are used as a guiding principle of the visual part.

Since the representation of it – Arabic numerals, decimal notation – may vary depending upon the current convention, the numerical base remains the same. The dot/dash symbolic system was used to explain the position of Sun (location map was used both on Pioneers and on Voyagers), the binary code (0/1 system) in both AM and VM. The search for communication basis can be demonstrated also on physical unit definitions (Fig. 22.). The purpose of following pictures is obviously to find a common speech, a communication channel, which would provide the recipient with the master key to the

GR contents. To reach understanding of the definitions is essential for decoding, compiling, and playing the data. As Samuels (in: Battaglia 2005) noted *"Here again we encounter math as the common tongue of all problem-solving species, and thus of interstellar communication, interlaced with ideas of aesthetics and expression in communicative action."*

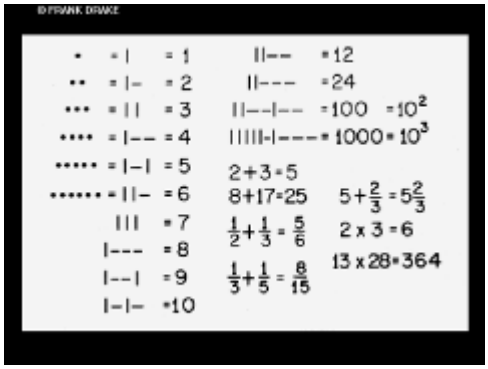

Fig. 21.: Mathematical definitions, Frank Drake

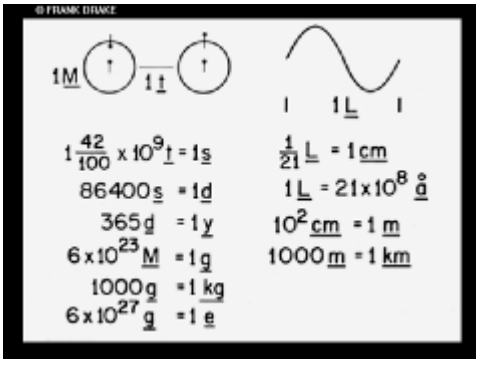

Fig. 22.: Physical units definitions, Frank Drake

The typically Cartesian duality of reason (expressed in mathematics) and body (expressed by biological base) shows us again clearly the reason as the principle that was applied in portraying the life on Earth. More that anything else 'life' now seems to us to be a conceptual scheme which must be consistent with the objective data in order to produce a knowledge that can be made visible, transferable and understandable.

On following pictures, we again recognize the principle that determines the general character of the VM. The chemical elements that in its combinations constitute all matter demonstrate here the very essence of life. On Fig. 23. we can see models of chemical elements: hydrogen (H, the simplest and most abundant element in the universe), carbon (C, occurs in all organic compounds), nitrogen (N, a constituent of all living tissues), oxygen (O, the most abundant element in the earth's crust and atmosphere). Also a model of phosphorus (P), an element that occurs commonly in inorganic phosphate rocks and as organic phosphates in all living cells[41], was incorporated into the diagram.

DNA (deoxyribonucleic acid) is associated with the transmission of genetic information and also described as the database of life. DNA concept, understood within the frame of interpretation offered above, seems to represent the biological analogy to mathematics (Fig. 24.).

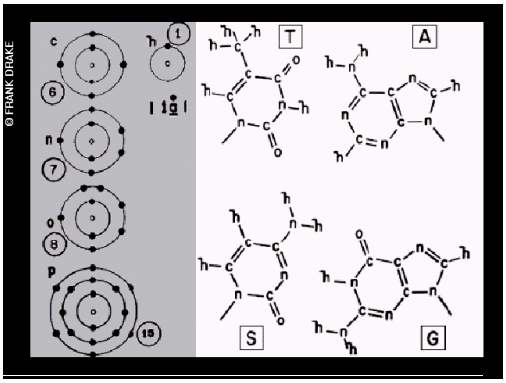

Fig. 23.: Chemical definitions, Jon Lomberg

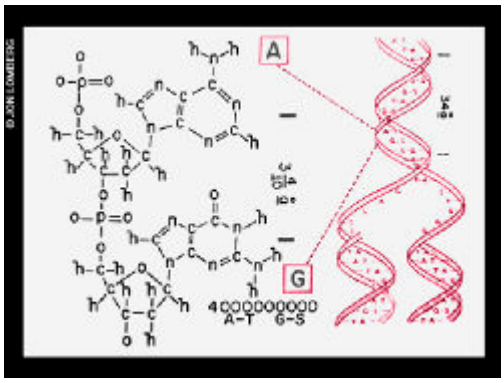

Fig. 24.: DNA Structure, Jon Lomberg

Let us now again remind the Sagans words (1998) that the intention was not to send scientific information exclusively. We will further explore into which degree this note is adequate for the compilation of the GR. The consequent question for analysis is if the VR includes only the base for interpretation, or if it is the interpretation itself. At this point of discussion let us quote Laqert (2000, referring to Agnus Fletcher) who mentioned that:

> *"Modern science, he points out, works to reduce the metaphoric connections between various orders of the world to one, to explain man and nature, the heavens and the earth, in one neutral mathematical language and not, as in the cultural world with which we are concerned here, by adumbrating a complex structure of resemblances, creating levels upon levels of connectedness between and within the micro – and the macrocosm, engendering correspondences as the demands of meaning dictate."*

Following part of this study will deal with the representation and visualization of human being in order to document the process of life creation and translates it to the story of life on planet Earth. Finally yet importantly, we will have a look on how the science gives a description of humanity and how it constructs the ideas about the essence of life, how it *"explains man and nature"*. The recognition and identification of the visualization process and of the display procedure might provide us with more conclusions.

9.2. HOW SCIENCE CONSTRUTS LIFE

This subchapter is intended to offer an ethnographic evidence of scientific representation the human beings, its procreation, and birth. We follow our presumption that the visualization the human beings were presented with certain respect to the scientific representation of life fundamentals.

We now use the visual sequence from the GR to figure out how the scientific point of view represents humans and how it

generalizes the diversity of life to its basics. The visualization of process how the humans is 'produced' forms the essential and extensive element of the GR´s visual portion. In the chosen visual parts, we try to answer the question how do humans look and how do they reproduce in terms of the VR. Following pictures describe the appearance of male and female sex organs, the process of fertilization, conception, and delivery. This sequence is displayed in chronological and as we will see in systematic order. Pictures had been enclosed in the same order as placed on the GR (Its numbering follows the numbering system of this dissertation).

The inevitable question is why the particular type of visual material was used to describe the human beings. The article *The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male- Female* by Martin (1991) motivated this chapter. Martin showed the gender stereotypes using the description of the egg and sperm representation within the scientific point of view, in biology in particular. In the centre of our interest stands the typically scientific way of representation the knowledge as a promotional effort to display the results (Kirby, 2003).

As an introductory note, it should be mentioned that the sexes are portrayed within traditional understanding the sexual differences and fixed into definite form without any deviations (Fig. 26.). This according to Laquer (1990) describes the modern anatomy based in the old metaphorical tradition (Fig. 25.). Similarly, the stress given on carnality is rooted in the tradition deeply; the analogical Cartesian concept of the machine-like organism is put on display here.

Fig. 25.: Anatomy 1, World Book

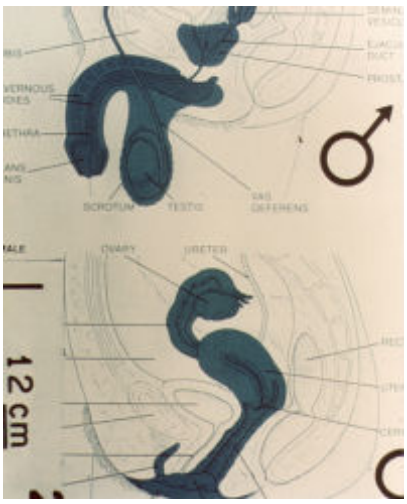

Fig. 26.: Human Sex Organs, Sinauer Associates, Inc

As Franklin (1995) stressed out, the science provides us with information, supplies us with the amount of ideas, it gives us the *"basis on which to theorize"* (Laquer, 1990, when referring to sexual politics). To make the information transparent and in order to

communicate it further, there are several disciplinary strategies how to demonstrate the results of scientific inquiry (models, graphs, diagrams).

We can subdivide the pictorial sequence into two basic parts. First part is created by real, true, colour photos that document the events. Second part consists of diagrams shows the output of conceptual thinking and the promotional efforts (Kirby, 2005). Following pictures show the conventional, at least in Western sociocultural area - model of contraception. The diagram explaining the size of sperm and penetrating the egg (Fig.27.) is accompanied by the biological record of conception (Fig. 28.).

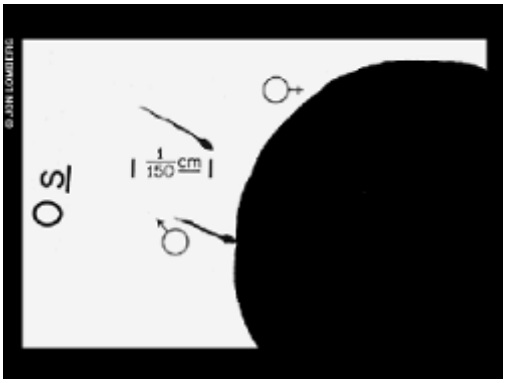

Fig. 27.: Diagram of conception, Jon Lomberg

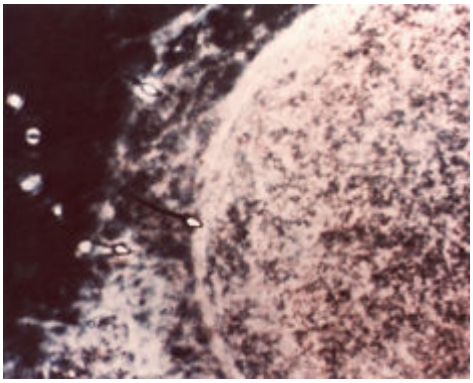

Fig. 28.: Conception, Albert Bonniers, Forlag, Stockholm

Again we can see the link between two-dimensional and colour pictures and recognize that the colour picture posed a model for the diagram. This activity of creating the diagrams is typical on the GR and it leads us to pose the question why was the double-representation used. We may suggest at this moment that the VR also uncovers the process of reaching, testing, using, and transmitting the specific knowledge and so attracts the conceptual curiosity of the recipient.

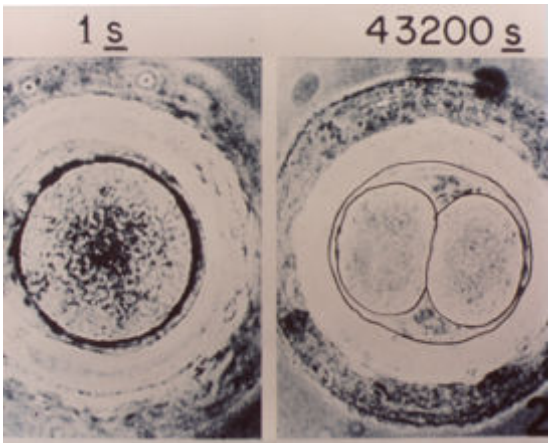

Fig. 29.: Fertilized ovum, Albert Bonniers, Forlag, Stockholm

An important but not obvious clue here is that the scientific knowledge had not only been acquired, but – and this is essential – it is being reproduced. The visual description of fertilization is followed by revealing the mystery of life (Fig. 29.). The picture of an ovum in the process of division symbolize here the very beginning of life illuminated by the light of reason for its time course in seconds was indicated (not size as referred above). The meaning of the pictorial sequence should be understandable for any adult

who passed through the school attendance in the Euro-American sociocultural area, or who is *"scientifically literate"* (Harding, 1991).

Following images (Fig. 30., and Fig. 31.) are communicating the embryological knowledge (Newman, 1996). The biological level of representation is derived from a historical tradition that determinated its current form. The representation of the foetus is again both symbolical and authentic; the diagram includes description of foetus evolution in time and space, using mathematical legend as a versatile tool that provides understanding.

Fig. 30.: Fetus,
Dr. Frank Allan

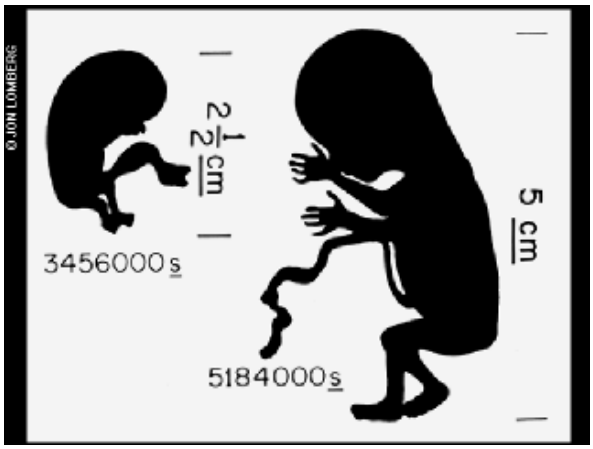

Fig. 31.: Fetus diagram,
Jon Lomberg

The meaning of these pictures in context of VR is simple: to show that human reproduce and what is important, that they comprehend the process of reproduction. From this follows that humans are able to hand the knowledge over in form of information. Except for a stage of foetus development, these pictures (together with those mentioned previously) demonstrate the *"knowledge producing activity"* (Kirby, 2003). The knowledge production process confirms not only the natural reality but also it documents the process of how the knowledge is being visualized.

Following 'Adam and Eve' representation (Fig. 32.) of male and female 'in touch' is surrounded by symbolism of sex, age, and height together with the position of the foetus in a womb. The purpose of the diagram is obviously to perform the most basic and general syllogism: children have parents. To fulfil the claim on universality of this bare truth of life, an unbiased trait was represented - the neutral diagram was used to communicate the accurate knowledge. It seems now that the body was removed from its

cultural meaning and in this theoretical framework, these bodies speak for all the bodies. This a global perspective seems to be an important point here and it also explains why only the basics were chosen and interpreted to accomplish the story of life.

It is not new idea that the science has penetrated the process of birth. We can observe that giving the birth to a child could not have been displayed in way that would be more neutral, scientific (Fig. 33.). The stress given on technological assistance and suitable equipment during giving a birth to the child is typical for the Western society. There is a logical link between the picture of *"Nursing mother"* and one of the audio tracks. The crying baby, mother's voice talking to the child (but in English). The further bond and care of mother for the child and the role of the father are documented on two pictures (Fig. 34., and Fig. 35.). The visual narrative of life of human consists in fact of nine pictures. The preceding descriptive anatomical part includes eight pictures. Although the biological facts description follows the chronological order, the result seems to be fragmentary and discontextualised. This is substantiated also by Latour (2004), who noted that the sciences remain objective, external, quasi objects exonerated from its networks. The discontextualization of life creation process points out the predominance of a specific viewpoint and one exclusive basis for interpretation.

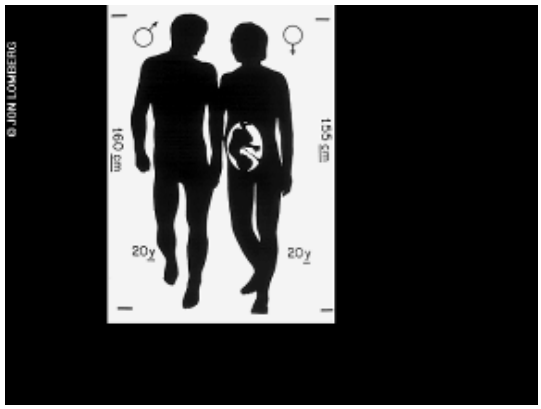

Fig. 32.: Diagram of male and female, Jon Lomberg

Fig. 34.: Nursing mother, UN

Fig. 33.: Birth,
Wayne Miller

The creators of the GR were profoundly ignorant of the alternative perspectives. There is the only one concept of conception offered without considering either native or indigenous knowledge. And what is as a rule considered important – the cultural context of reproduction (e.g. Murphy 1989), the institution of marriage and social habits - was missed out entirely, which makes the description of human life incomplete. Similarly, the social relations are roughly drawn in *"Family portrait"* (both shown in Chapter 6.). We can recognize now, that the pictorial sequence goes from one anonymous that body speaks for all bodies, from anonymous individuality, to interactions, relationships and people with faces. The anonymous body was used as a sample of a human, as a subject of interpretation.

Fig. 35.: Father and daughter (Malaysia), David Harvey

Fig. 36.: Group of children, Ruby Mera, UNICEF

Short discussion is desired at this place. The life creation story offers not only the description but at the same time the explanation and interpretation of what life consists of. There is displayed what was discovered about the natural world so far, the very peak of scientific knowledge. Moreover, it seems that only similar and compatible patterns of data interpretation (Martin, 1991) were used and arranged all together in order to make a continuous and coherent story. Harding (1991) cited Haraway stressed out that scientific knowledge is always socially situated – *"Neither knowers not the knowledge they produce are or could be impartial, disinterested, value-neutral, Archimedean."* The disciplinary strategies were used to offer a story of life. It was shown that the samples from pictorial sequence indicate the disciplinary strategy of legitimation and representation of the research outcomes.

We have suggested above that the process of displaying the knowledge

necessarily involves the discontextualisation in order to communicate the valid knowledge and supra-cultural data using the neutral bodies as a subject of explanation. This seems to describe the way in which science works but it does not necessarily mean that the GR offers the independent and general information. Conversely, we together with Franklin (1995) suppose, that *"science is defended so vehemently because it is cultural, not because it is extracultural"*. Thereby this story can hardly be described as objective, neutral, or entirely absolved from its cultural bonds. More than transferring accurate information and portraying the value-free neutrality, the body that speaks for all bodies was inherently *"bounded to its cultural meaning"* (Laquer, 1990). The idea of meaning-production was pointed also by Harding (1991) who mentioned, *"science produces information, but it also produces meaning"*.

In this subchapter, we have recognized typically Western viewpoint as an impetus of the pictorial sequence. The representation used reminds us the textbook of nature study for grammar schools. No wonder, we are *"scientifically literate"*. It is obvious that more than displaying objective, epistemologically valid information, the GR communicates the scientific viewpoint. The story of life is a scientific fairytale (Martin, 1991).

10. TECHNOLOGY, AND DEVELOPMENT – THE VOYAGERS STORY

"What can be shown, cannot be said."
Ludwig Wittgenstein

Before entering the human progress issues, we will shortly explore the representation of natural world. It seems that the GR offers representation less coherent than the previous story about life. One possible explanation is that the part dedicated to nature does not exclusively express any knowledge achieved through the scientific process, but is just documenting the objects of nature and a place of humans in nature. It was previously

mentioned that the detailed look at the visual part of the GR reminds us also the *"virtual witnessing"* (Kirby, 2003). Nature as presented in GR is a stage where the story of life on planet Earth takes place.

Fig. 37.: Underwater scene with diver and fish, Jerry Greenberg

Body of evidence that would describe the biological diversity on planet Earth in detail is not extensive. The characteristic feature of it is the contextual description of humans, its environment, and activities (e.g., Fig. 37., and Fig. 39.). As on many places, the scientific description of the nature is present in what we call the natural history part of the GR (Fig. 37., Fig. 38). The nature is shown in context to human and again accompanied by explanatory explanatory measuring scales; please see the H_2O formula in upper left corner (more on Fig. 28., and Fig. 29.).

We suppose that nature serves as picturesque scenery for the story of life on Earth. Creating and telling the stories – both important processes of each branch of science – are demonstrated not only in TV documentaries, but also on the GR. We met already the perceptible indications of the idea that science is the appropriate tool to explain and describe not only the humans, but also its world, and to hand it over in enduring form. The very design of the GR is the result of scientific process, the *"knowledge producing activity"* (Kirby, 2003) or in other words, or *"scientification"* (Haraway, 1989), that enabled the transformation of human life to an information.

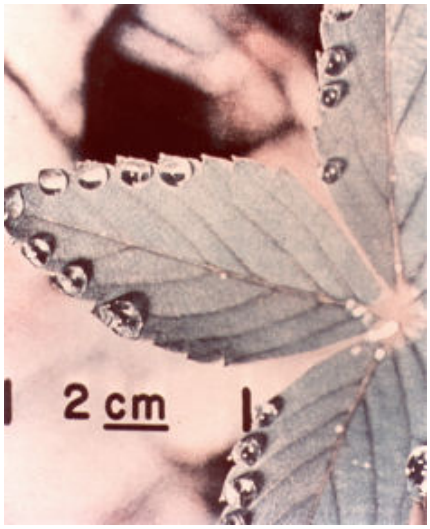

Fig. 38.: Leaf, Arthur Herrick

Fig. 39.: Fallen leaves, Jodi Cobb

10.1. PROCESS OF SCIENTIFICATION

To work out further our understanding the message contents it seems essential to encourage the process of *scientification*. Haraway (1989) described science as the continuous process of facts production (same notion in Kirby, 2003). It includes the story-telling practice, narrating the history of nature. A particular knowledge gained through the research is not only establishing facts but also it transfers it into its re-representation. The scientific practice itself is always mediating and representing the results although it declares itself an explanation.

We have seen that this scientific practice shaped the final arrangement of the GR. We are able to determine three essential concepts behind the VR. First is expressed in the idea that the communication across time and space is possible. This possibility is facilitated by universal force of mathematics and by the progress of technology. The knowledge may be transferred to a logical matrix or mathematical representation and to be communicated further. Mathematics is not only the universal principle, channel of communication, and versatile 'language', but also the attribute of intellectual powers that are logical result of the evolutionary progress. Samuels summarized (in: Battaglia 2005) that the *"communicative codes of science were privileged. Mathematics was the lingua franca: philosophical musing aside, it was assumed that 2+2=4 and hydrogen is hydrogen, on Rigel as well as Earth."* It was shown that the same principle counts for AM as well as for PM.

> Second, the accent on carnal facet of humanity is easily understood. This special importance of 'body' as a physical structure of an organism (as shown in previous chapter) simply excludes the 'spiritual' or 'sacred' or simply 'more human' aspects from the message contents. The demographic fact that almost every nation and country of our era has some religious life was ignored entirely. Moreover, it surely would not be correct to assert, that the spirituality of peoples on the Earth might be incorporated into the collection of classical and native music. The omission of religious component is accompanied by the ignorance of symbols (or work of art) that could be considered religious as well.

> Third concept is that there is an impetus present, almost of spiritual strength, and that is the human intellect. The belief that the discovery of natural laws might provide an absolute truth contributes to the process of continuous transforming the reality and world into the specific set of knowledge. However, an intellect is the result of a long process in which humanity passes by degrees to a different stage. The order of the VM documentation follows the ascending tendency in representing the story about humanity to an interested audience. When having closer look at the pictures we may notice, that the immanent logic of the pictures arrangement goes from basic introduction of terrestrial science to humans and continues from nature to state-of-the-art technology. The idea of development and progress within particular context of science and technology were used to complete the story about life on planet Earth.

To sum up we use the allegoric description of the GR message: Humans are

intelligent, they have reached the sufficient degree of scientific progress, and they are (were) here. This more or less vague description is nonetheless a useful one.

10.2. ENLIGHTMENT AND DEVELOPMENT PERSPECTIVE

The idea of progress is embedded deeply into the story about humanity on planet Earth. For this reason, this subchapter takes into consideration modernization and development perspective and for exemplifying purposes uses the pictorial sequence of the GR to provide evidence for ascending tendency of the global story about the humankind.

According to Hettne (1995), the theory of development engages all aspects of society: *"Development involves structural transformation which implies cultural, political, social, and economic changes."* Schech and Haggis (2000) pointed that development might be either process or intention. The idea of progress according to Shanin (in: Rahnema, Bawtree (1997) is a stigma of post-modern western area, and an ideology.

The idea of progress is the heritage of Positivism – originally the school of philosophy that became theoretical framework of modern science and its methodology. Positivism as the form of empiricism that bases all knowledge on perceptual experience remains the conceptual foundation of Western rationality. Along with the idea of positivism, the science process of inventions, discovery, and progress goes is steps through the continuum of stages.

We have already shown and discussed that the GR does not comprise a reference to negative consequences of human activity. It seems more and more apparent to us that the GR denotes also the positive value system. As Sagan acknowledged in the Forum of Harper's Magazine, the committee made an effort to *"convey a truthful view of our planet and ourselves, although we probably erred in downplaying human failures in favor of human triumphs."* (Sagan 1986:Nov.) The inevitable question follows - what is considered a human triumph? We have to descend to the very roots of progress idea to look for the answers. In the previous chapter, we were offered rather quantitative view, which now goes to gain the qualitative dimension. We will explore furthermore whether this idea is displayed on the VM in the most positive way as a value.

The Enlightment perspective might help us to identify the basic structure of the value-system, which describes the GR contents in an ideological way. In context to natural world, we meet the Enlightment perspective was as described by Bednix (1967): *"As the idea of God became fused with that of Nature, the concept of the universe created at the beginning of time was gradually replaced by the idea of an infinitely various and*

endlessly active process of evolution". To point out the basic principles of Enlightment, we use the systematic overview as offered by Schech (2000): reason, empiricism, science, universalism, progress, individualism, secularism, toleration, uniformity of human nature and freedom. To support the arguments we use the pictures from GR.

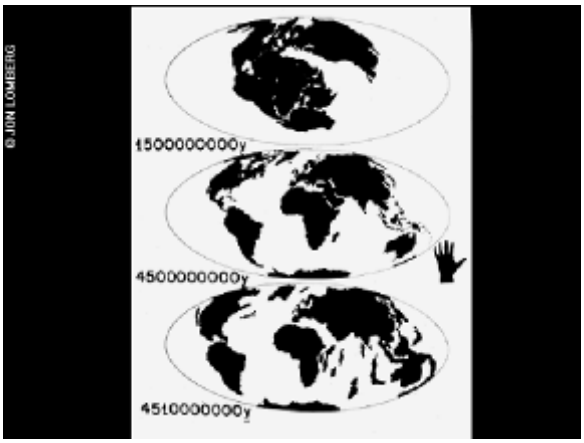

Fig. 40.: Continental drift, Jon Lomberg

The first principle asserted by Enlightment is the *reason*, which is automatically considered as an attribute of any intelligent being or *"knower"* (Harding, 1991). The importance of reason as a basis reasoning and rationality as the quality and value are strongest aspects of Enlightment. Schech (2000) describes the reason as a *"principal way of organizing knowledge"*. Reason is also the base why the VM is being understood, for it *"produces ideas independent of experience which can be demonstrated to any thinking person"* (Schech, 2000). The attached picture (Fig. 40.) shows the continental drift in time, in this context the *"idea independent of experience"*. The image represents the past, the present position of continents (indicated by black human hand) and its future location. Here again we meet another expression of what we described as *"problem-solving approach"* as referred in Samuels (in: Battaglia 2005).

The fundamental assumption of reason as a base from which something is explained is followed by *empiricism*, which adds the emphasis on perceptual experience and the subsequent transformation of the sensory perceptions as a basic component in the formation of concepts. Several strategies (scientific methods) are used during the *"knowledge producing activity"* (Kirby, 2003).

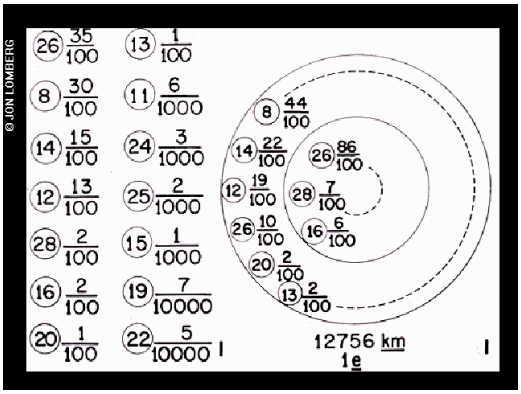

Fig. 41.: Structure of Earth, Jon Lomberg

Every piece of knowledge must be based on empirical fact (Fig. 41.). The importance of valid facts also explains why the indigenous knowledge was either ignored or not involved in the GR - it is considered invalid. However Harding (1991) would argue that the

"'indigenous peoples' of the modern West – those most at home in Western societies – have culturally distinctive belief patterns in which scientific rationality plays a central role"

Science was defined by Schech (2000) *"as a key to expanding all human knowledge"*. This expansion goes in this respect far beyond our Solar System, beyond the world of our everyday experience and in fact far beyond any imagination. It is the science what speaks now for all people in the term of modern politically and technologically prevailing country.

Fig. 42.: X-ray of hand, NAIC

Universalism is characterized by the belief, there are general principles and consistent laws, which can be understood and described. The knowledge is transferable into a set of rules, principles, or laws that enables to communicate it further. We have already met his typical changeover into communicative form (mathematics, hydrogen transition model, carbon base concept). The scientific knowledge is believed to be generally universal and in this sense also understandable.

Fig. 43.: Woman with microscope, UN

Progress and improvement are the consequent effects of reason and science. The idea of progress itself is considered a secular one, as was stressed by Shanin (in: Rahnema, Bawtree, 1997). The progress is the positive value because it provides people with well-being and optimistic prospect of future. It seems that the homogeneity of development and equability of opportunities to growth might erase all the cultural differences and social inequality (Fig. 43.). *Individualism* is very objectionable aspect of the Enlightenment concept, yet one of the central ideas. As referred in Schech (2000) *"the individual cannot be subjected to a higher authority"*. This is hardly valid and applicable on the current general state of things in the world. Freedom is already expressed in an individuality claim. Schech employed the historical perspective to

explain that personal freedom stands in for *"opposition to feudal and traditional constraints of belief"* and concerns all aspects of human life.

Secularism is another expression of the idea of progress (also Shanin in: Rahnema, Bawtree, 1997). As mentioned above the VM does not contain any reference to either religion or sacred beliefs. The pure knowledge prevails – as in science as well as in the GR. *Toleration* is the expression of the idea that there is equality in every aspect of humanity – gender, race, opportunities etc. (please see Fig. 43.) According to Schech (2000), it includes the presumption that *"all humans are essentially the same"*. It also includes the ideal that there is a human essence, which is common for every human being. This is another expression of the ethical concept, which has been fulfilled on the VM. The stress was given on the biological level that into some degree erases all differences. Similarly, the picture of human organs, the extensive part of the GR, expresses the same idea (Fig. 45., and Fig. 46.). There are just 'lungs', 'gall bladder', or 'brain', people are "one flesh" (Laquer, 1990). The same principle entails also the model of a double helix; the DNA concept is a necessary accompaniment of what was represented as life.

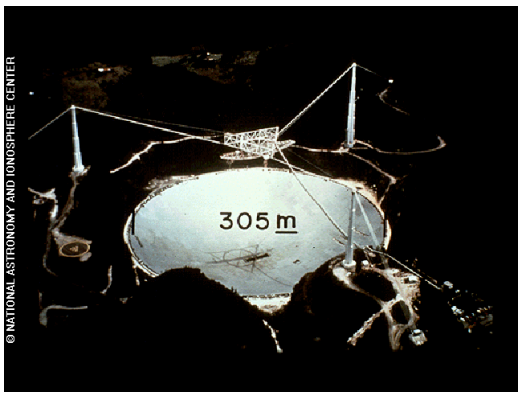

Fig. 44.: Radio telescope (Arecibo), NAIC

Uniformity of human nature is the concept balancing between ethics based in medical science and the belief there are universal principles. Opposite to diversity as described by Shanin (in: Rahnema, 1997) stands the idea of diversity as *"result of different stages of development of different societies"*. However, diversity of life on Earth has been displayed in very secular way and it has been transformed into isolated, discontextualized compilation. The uniformity was in case of the GR interconnected to the demand on universality.

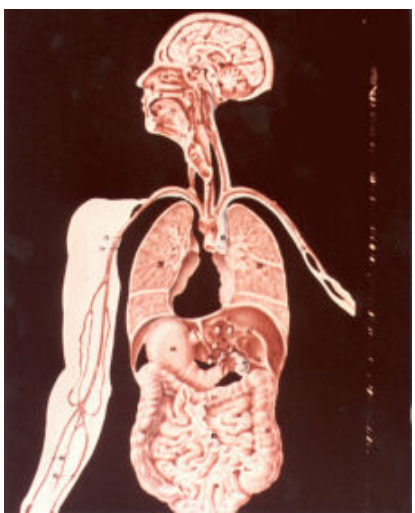

Fig. 45.: Anatomy 8, World Book (on the left)

Fig. 46.: Anatomy 4, World Book (on the right)

It seems that the predominance of typically western scientific approach to knowledge had determined the structure and contents of the VM. The indigenous, native knowledge about the world is considered local and possibly insufficient because it is not in agreement with above given scientific requirements. The attempt to reduce this imbalance between prospective, technologically developed countries and the rest of the world is partially equalized by pictures of native cultures; this is also the expression of the toleration idea. As previously mentioned the choice of the information was led by idea to show the better part of humanity. The expression of how things should be and not the description of actual state of things indicate presence of immanent value systems. The GR is into some degree the description of an ideal state of things.

Enlightment movement stands at the very beginning of the modernity idea that constitutes the development concept in time in space. The modernization and procedural aspect of development will be stressed out rather than dependence theory in this subchapter. However, the modernity is rooted in the tradition and this tradition influenced and constituted its very characteristics. In reference to Bendix (1967) who deals with development from rather historical perspective, modernity begins with the vague-like idea that *"Their first impulse may be to think of 'the modern' in terms of present-day technology with its jet-travel, space exploration, and nuclear power"*. According to Shanin (in: Rahnema, Bawtree, 1997), the development paradigm contains the idea of progress. *".. It offered a powerful and pervasive supra-theory that ordered and interpreted everything within the life of humanity – past, present, future."*

The idea of progress has its reflections on many places. To view the GR from cultural perspective as an extraordinary phenomenon and to explore its relation to the development theory further, it is necessary to point out the basis of interpretation. We regard the VM as the result of intellectual history (Hettne, 1995) and a way of interpreting the social and cultural reality.

It seems that the content of GR is a reflection of modernisation theory and that it contains all the aspects of Enlightment that were outlined by Schech. This concept of modernity is deeply rooted in the intellectual tradition as shown above. There is neither invention nor inner progression within this particular sight. It establishes and expresses the attributes of typically Euro-american system of thoughts.

10.3. UNIVERSAL KNOWLEDGE

The above-mentioned reasons provided insight into the story, which now seems to be a scientific narrative about human beings and its environment, a type of the modern myth about humankind par excellence. Some might take an objection that variety of specific languages were used to communicate the story of mankind – not only numbers,

definitions, symbols, diagrams, but also visual presentation, voices, sounds and music sheet that may have made the concept behind the VM problematic and not so easily to distinguish.

However, there is an obvious preference of one language, which has to be considered as the most important, and that is the language of science. To make clear about the purpose of using this language – it is expected to be universal; it creates the base for interpretation of knowledge. The multinational monopoly on 'objectiveness' is held by western science. Science on VR is an 'objective', the continuance of the positivistic doctrine. This is displayed more or less obviously in every single part of the VR. Above the universalism was defined as a belief there are general principles and consistent laws, which can be understood and described.

This brings another important aspect of these issues. Moreover, it seems that the message includes the belief, that the objective scientific knowledge is understandable to any intelligent being and moreover that it is understandable for the presupposed extraterrestrial being. Hence, we may conclude, that the Esperanto language of the universe as expressed in numbers, was/is believed to be understandable to any civilization that obeys with reason and some system of knowledge similar to science.

It had been demonstrated above that the GR expressed the superiority of mathematics and physics. This reminds us the Comte´s philosophical concept of hierarchical science stratification. As Harding (1991) mentioned *"Physics, with its reliance on quantitative methods and its positivist ethos, is supposed to be accorded the highest rank among the natural sciences, with chemistry and then the more abstract areas of biology following behind."*

The system of thoughts that established the VM final shape is the result of long process and expresses the attributes of typically Euro-american system of thoughts. Similarly, the concept of modernity is deeply rooted in the intellectual tradition. The attempt to describe the world as a totality is the expression of an ideal or concept rather than description of pure facts of the real world. The development theory and scientific objectiveness are the same result of one source – the positivism heritage.

We suggested that this act might imply the demonstration of power, or indicate the

prevalence in the knowledge what stand in from the VM. The relation of power and particularly the technological prevalence was applied upon the world and all its cultures when creating the GR. There is no variability, differentiation and that makes the world so complex and particulate at the same time. More likely we met the process of creating *"cultural artefact"* (Schech, Haggis (2000), 2) or cultural construct that was culminated on the GR.

11. EXPERIMENTAL PART

This chapter goes to prove that some of message contents are no longer valid from the current point of view. It is our basic assumption that the scientific paradigm has been fixed into compact visual form. This gives us an unique opportunity to explore the

paradigmatic ‘shift’ directly. When considering the process of change within sciences, it should be mentioned that some of the scientific facts introduced on the GR in 1977 do not fit the current worldview in 2008. We should mention that we deal with an illustrative example of scientific paradigm in Thomas S. Kuhn´s terms[42]. In following subchapter, we try to show current example of how the paradigm has changed recently.

11.1. PARADIGMATIC ATTRIBUTES

In 2006, the International Astronomical Union (IAU) conference was held in Prague, Czech Republic. The scientists from all around the world were looking for an answer a question: Is Pluto a planet? The objective was to state what actually planet is and to distinguish between ‘planet’, ‘dwarf planet’ and ‘other objects’. At the end, the new definition of a planet was drafted and consequently it was decided by vote that Pluto does not meet the requirements for a planet. The IAU Resolution B5 stated the new valid definition of a Planet in the Solar System and redefined it to “the prototype of a new category of Thans-Neptunian Objects[43].

As we can see, the definition of a planet has been readjusted which literally means that Pluto is not a planet anymore. Not every of the celestial body that revolves around the Sun in the solar system is recognized as a planet. The smallest ex-planet lost its status after more than 70 years. The Solar System proportion has been changed and reduced to eight planets and the new concept of our Solar System was offered to the public. And it will be necessary to rewrite the courses outlines and textbooks of astronomy. This event allows us to observe directly how easily the vision of the world might be changed. It is the convention (Kuhn, 1997), the general agreement of scientists, what shapes the general understanding the world.

This particular example of paradigmatic shift within astronomy was not mentioned without following a purpose. Attached pictures (Fig. 47., and Fig. 48.) originate from the GR and they describe the Solar System parameters in 1977. These figures document not only the importance of numbers and mathematics in defining the proportions of the Solar System but also demonstrate the period piece of knowledge.

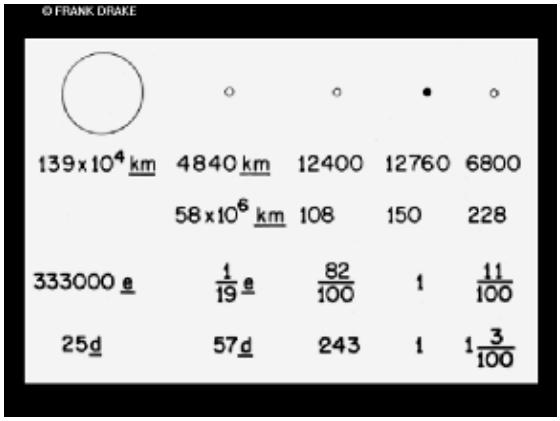

Fig. 47.: Solar System parameters, Frank Drake

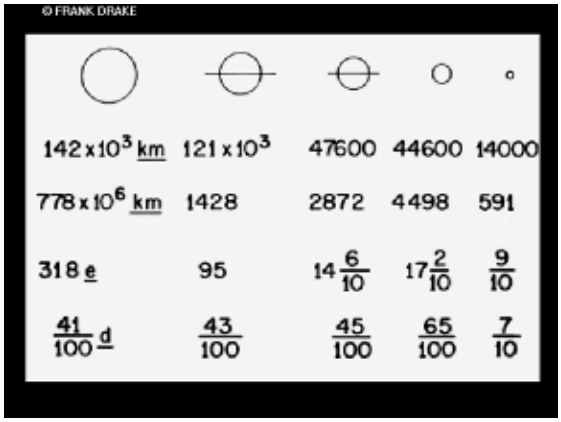

Fig. 48.: Solar System parameters, Frank Drake

11.2. THE NEW SCIENCE

Not only the scale of knowledge is changing but also the science itself goes through the process of change. There are many examples and evidences of this process in contemporary sciences, and new disciplines and branches are being established. It was shown above that the search for ET life, although often considered speculative or purely theoretical, was officially adopted by science. The further explorations of the universe and the search for a life are an important enterprise for contemporary science[44].

Time to time, the media announce that the new extra solar planet was discovered. Another important quest for scientists is to detect the trace of elements that are considered important for life formation. During the past decades, serious discussions took place and the scientists were trying to specify what life in fact is and therefore for what to search in the universe. Hence, the new disciplines like astrobiology, exobiology, or xenobiology are analysing not only the objects of our Solar System but also the extra-solar ones.

However, the radio-astronomy (SETI Program) does not seek for 'any' life form. The signals from the universe are analyzed in order to detect the artificial source of signal, signal transmitted by advanced technology. Similarly, the Pioneer and Voyagers messages were not sent to detect 'any' life form but to establish a communication with an advanced extraterrestrial civilization.

11.3. FOOTPRINTS

Taking into consideration the distances in the universe and the minimal likelihood that such a small object as a spacecraft would be successfully detected (facts that the creators has to be aware about), we inevitably reach the conclusion that to send a message just make no sense. But, how to justify the risky and expensive venture? There is another idea that should not stand aside from our attention. It was partly formulated by Havel (1998) in his announcing sentence: "*We are here too"*. Let us mention at this place that the Pioneer plaques were described by NASA (1977a) also as *"a mark of Man"*.

The idea to install informative plaques or messages on the U.S. spacecrafts is not as isolated case as it may seem. Moreover, it became a standard of the NASA Space Exploration Program. As Samuels mentioned (in: Battaglia 2005), NASA asked Sagan to arrange the informative plaque for LAGEOS I Satellite (LAser GEOdynamic Satellite). Similarly, each of the U.S. spacecraft carries its own informative plate that is conveying information about its country of origin. For example on the Apollo 11 plaque there was written*: "Here men from the planet Earth first set foot upon the Moon. July 1969, A.D. We came in peace for all mankind."* Four signatures of the American representatives of planet Earth follow the quoted text. The demonstration of an egalitarian approach is however immediately followed by raising the U.S. state flag on surface of the Moon. Similarly, the VM was sent in the name of people of planet Earth with the U.S. state flag attached.

Fig. 49.: Apollo 11 Bootprint, NASA

With the Moon-landing story, another example is linked – the famous snapshot known as *"Apollo 11 Bootprint"*(Fig. 49.[45]). It was made by Neil Armstron, the first human who stepped out off the lunar lander on the surface of the Moon. As NASA commented: *"The footprints left by the astronauts in the Sea of Tranquillity are more permanent than most solid structures on Earth. Barring a chance meteorite impact, these impressions in the lunar soil will probably last for millions of years."*[46]

It would be interesting to learn more about the meaning of the state flags that dotted the discovered worlds. People have conquered the tops of the mountains, bottoms of the seas, the poles, the Moon, and several more objects of Solar System. Do the Voyagers except for the 'best of planet Earth' compilation carry on the sprit of adventure? The positive answer to this question would explain the use of parables like *"traveller"*, *"sailing"* in text referring to the space exploration. It reminds us the pioneering medieval seafarer expeditions that left the safety of the haven to discover and to conquest the new worlds. For instance, Sagan (1998) uses the naval term *"caravel"* when referring to Voyagers space-ships that sail to the stars and explore the unknown worlds. Voyagers and Pioneers are not only the robotic probes but also the conquerors of

distant times and places, the first footprints of humankind in an interstellar space.

11.4. IN MEMORY OF HUMANKIND

The VR was intended to be something that might be written in stone. In fact, it was[47]. There is no any doubt that the probes were designed to meet strict technical requirements in order to survive in the hostile environment of outer space. The particular accent on permanency of the GR itself, its protective cover, the material used, etc. may indicate more. Sagan expressions *"time capsule"*, *"message in the bottle", "survive us all"* suggest the idea that something permanent was intended to speak for us all one day in the distant future.

Sagans prognosis on future of humankind was pessimistic, or even apocalyptic: *"A billion years from now, when everything on Earth we've ever made has crumbled into dust, when the continents are changed beyond recognition and our species is unimaginably altered or extinct, the Voyager record will still speak for us"* (Sagan[48]). The title of Havel's article *"We are here too"* (1996) turns over in Sagans view to *'We were here too'*. In this respect are the Voyagers probes are the witnesses of extinct species that had sent a message to let anybody know that there were life present on planet Earth.

Symbolically, and only in this sense, the VM balances what was missed out from the GR contents – the human mortality. It is our last suggestion that the GR highlights the desire to leave something immortal behind – the Voyagers.

12. CONCLUSIONS

Maybe one day in distant future the interstellar probes will reach its final destinations and give out its testimonies. Maybe one day the extraterrestrial scientific community will detect the permanent medium that had been sailing the universe for thousands of centuries far away from inevitable changes on planet Earth, and remove the protective cover in order to play the Golden Record. The question whether the celestial messengers will ever deliver the *"time capsulae"* was not essential for us. We believe that *"message in the bottle*" already hanged over its contents.

Nevertheless, we cannot entirely ignore the potential recipient. Let us stress out a significant divergence of opinion in what 'life' in the universe and 'life' in the universe entails to conclude on Chapter 5. and to sum up on the ET life discussion within scientific

understanding the question. There are recent endeavours to detect the current existence of chemical elements on extrasolar planets. To find water on an extrasolar planet would be a great success, and the detection of a single-celled microorganism that would originate e.g. from Moon would be a cogent evidence of extraterrestrial life. However, the above listed programs: Arecibo Message, Pioneer Messages, SETI Program, and finally Voyager Messages lay far greater claims on the presupposed ET life. The addressee of these messages is not simply a different life form or other life in the universe, but the civilization! I hope that it is not exaggerating to state an opinion that a prediction of a civilization had been made by extrapolating, by transferring the ideas and principles of life from Earth into cosmic domain. To this idea contributes not only the Panspermic Idea and the Parallel Evolution Concept but also the Drake Equation that was designed to calculate the number of advanced civilizations in the universe. Let us extend more on the idea of extrapolation. Assuming science as logical consequence of evolution opens a possibility that also terrestrial science has its cosmic sibling.

High degree of technology, advanced science, concept of laws of the universe, knowledge of mathematics, and conceptual thinking ability, every of those aspects are expected from the advanced civilization. Let us point out again the terms *"riddle solving"* (Kuhn, 1962), *"problem-solving approach"* (Samuels, in: Battaglia 2005), and *"curiosity"* (Havel, 1996) that do not only formulate the conceptual framework of the VM but also describe the intellectual prerequisite for deciphering the VM´s 'interstellar sudoku'.

Another aspect of the GR´s compilation deserves to be mentioned again. Since the contents of VM were kept in secret, the inevitable question follows: who were given the privilege to speak for all people on planet Earth? The logical answer is: the scientists and specialist who beyond any doubt made their best efforts to compile the GR and who were aware there were more possible selections (Sagan[49]). However, it would be incorrect to assume that the Voyager message spoke for relatively small group of people - for their beliefs, opinions, ideas about the world and the universe. Despite the fact that the GR contents seems to be unilateral – at least from the global perspective - it was set into broader socio-political context. Not only was the Voyager Project designed and managed by the U.S. space agency but it was officially supported by the U.S. government, e.g. the greeting from former U.S. president, the U.S. national flag, etc. The central role played also the United Nations who provided both greetings of its representatives and the U.N.

secretary and many of pictures. From this viewpoint is the Voyager message an outcome of social reality. Not only history but also the current socio-political circumstances shaped its final contents. Finally, the data acquired from Voyager probes have also the terrestrial dimension and social impact; let us one for all mention the external view on planet Earth and the new strategic defensive initiative of the U.S. to militarize the outer space.

Let us now return to the museum allegory, that had been used in previous chapters to sum up on our first research question about what does the message contain. Several types of representation were employed in order to offer a coherent story. We have investigated both visual and audio parts of the GR to find out that the compilation of the GR was organized systematically, in ascending linearity, and the general approach to data assembly was interdisciplinary. The compilation of the GR is coherent, but there may be many objections raised against its sufficiency. It was more or less obvious that many things were left behind in the allegoric 'depository' because the utterly complex and comprehensive description of life was hardly either expected or realizable. For us it is important the specific viewpoint or *"mind-set"* (Harding, 1991) was demonstrated on the GR.

It is our **first conclusion** that the life on planet Earth was assembled in form of a documentary that presents the facts about persons (humanity) and events (nature, technology). The pictorial slide show or 'visual display' contains diagrammed drawing, schematic representations, coloured pictures (photos), sounds, voices, noises, and music. A communicative function of various visual representations (photos, pictures, diagrams) should not stand aside from our concern. Photos and pictures document the human activities but the relations among pictures are described by mathematics. All those signs and symbols, definitions and diagrams seem to draw the basic link that connects the message contents. Similarly, the base of life was explained by chemical definitions, another scientific way to communicate the knowledge using conventional symbolic.

The picture gallery was associated with enjoyable musical accompaniment. To describe the totality of GR and to examine its contents, we have elaborated the allegoric parable of a museum as a depository for collecting and displaying objects. This hypothetical visit of museum full of the colourful photo exhibits and cultural artefacts along the walls was followed by the idea that the visitor may be fascinated by the

wonderful diversity of nature and cultures, and feel enthusiasm about the extent of the exhibition. We were *"virtually witnessing"* (Kirby, 2003) the GR as the promotional device of science. The documentaries as well as the GR employ the visual display to offer interpretation of reality.

The GR offers an adequate quantity of data to achieve its purpose: *"to create a story"*. The compilation of GR shows the ascending tendency of either images or sounds as was shown in both chapters 7. and 8.. This leads us to our **second conclusion**: we deal with the scientific narrative about human beings. The story-telling practice is an activity typical for science, but the arrangement of the GR was not a by-side effect but the intention. Therefore, not scientific information exclusively was offered, but the contextual description of humans, its environment, nature, and activities were provided. It is true that GR contains except for "*multiple media and much more than science"* (Samuels, in: Battaglia 2005). Nevertheless, as a leading principle and an explanatory power, the scientific descriptions were employed. Particular branches of scientific knowledge were put on display: astronomy, anatomy, physics, biology, genetics, chemistry, geology, and mathematics as a versatile tool dominating all scientific disciplines. The product is the post-modern myth about humankind – about its origins, appearance, evolution, development, and its technology. GR contains the causal explanation and demonstration of how science understands the people and nature. To sum up on this topic we use Harding (1991) words on science: *"It is an 'origins story', a fundamental part of the way certain group in the modern West identify themselves and distinguish themselves from others. It is metaphysics, an epistemology and an ethics."* It was shown in Chapter 10. that the *"origin story"* begins with one anonymous body and goes to humanity (all of the inhabitants of the earth) and follows the ascending tendency from natural world as the physical world including plants and animals and landscapes to the practical application of science – the technology. The ideal of progress was studied as a value in this work and it was set into context with basic characteristics of the Enlightment perspective Schech (2000): reason, empiricism, science, universalism, progress, individualism, secularism, toleration, uniformity of human nature and freedom. Both first and second conclusion answers our first research question about what the message contains. We were offered a story with the happy end – the human triumphs.

We have made more or less clear that Voyager message stand in for a textbook example of the Western scientific viewpoint, or *"mind-set"* (Harding, 1991). Thus, we

answer the second research question and state our **third conclusion** on what were the preferred channels of communication: the scientific understanding the world shaped the communication channels in the GR. As Samuels (in: Battaglia, 2005) stated, the "*communicative transparency"* as "*the clearest marker of technological or cultural superiority."* Not only the very idea of sending a message to the universe steams from scientific comprehending this issue but also the composition of the GR attributes to this explanation. The specific channels were used to communicate the story of humankind, all of it based on scientific approach to the world as an "*interlocking practice"* (Harding, 1991). The data gained throughout the process of *"scientification,"* or in other words the research outputs, were transformed into knowledge and assembled together to re-represented the reality - to narrate a story (Haraway, 1989). Everyone who is *"scientifically literate"* (Harding, 1991) is capable of understanding this story and to comprehend its meaning. The portal of the Golden Record - the diagrammatic engravings on the message cover – demands the approach typical to science, the "*riddle solving"* (Kuhn, 1997).

The scope of science prioritizes the mathematics as the universal expression of abstract thinking ability; the basic presupposition the senders of the message had about its potential recipients. Not only the intelligence, rationality, empiricism and scientific method but also several more *"shared codes"* (Samuels, in: Battaglia 2005) were displayed by the GR. The hydrogen transition concept as a presupposed condition of interstellar communication stands for the most illustrative example. Similarly, the music was included because it is believed that there is a mathematical harmony enciphered in it (Samuels, in: Battaglia 2005). It was shown that mathematics is supposed to be an universal tool of interstellar communication efforts.

For many reasons was the GR a scientific enterprise. The apparent prevalence of the intellectual domain, rational base of interpreting the story, types of representations used, ascending linear tendency of the story, the underlying structure of a value-system, and socio-political context; all of it characterizes the specific viewpoint: the contemporary western science. We were offered the authoritative explanation of the world (Harding, 1991). The study of Voyager message gave us unique opportunity to investigate how this scientific point of view represents the ideas about humanity and its environment. But we have also seen that this view changes in time. From position of current time, the past (from 1977) scientific interpretation of our world was sent on

Voyagers to the universe.

In the conclusion of this work, allow me to send the symbolic message and to express in other words one more idea about the contents of the Golden Record. The ending sentence of this dissertation, the reaction of a student of anthropology who received this message in 2008, was adopted from the lyric of immortal requiem composed by Wolfgang Amadeus Mozart in 1781:

- - -

LIBER SCRIPTUS PROFERETUR
IN QUO TOTUM CONTINETUR,
UNDE MUNDUS JUDICETUR.

- - -

A book, written in, will be brought forth,
in which is contained everything that is,
out of which the world shall be judged[50].

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National Space Science Data Center. NASA's permanent archive for space science mission data: http://nssdc.gsfc.nasa.gov

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NOTES

[1] Similarily refered by S. J. Dick (2006).
[2] And more. For example, the NASA´s Carl Sagan Fellowship to Study Extraterrestrial Worlds was established. The NASA Media Relation Office, News Release: 2008-170, September 3, 2008, announced the new Postdoctoral Fellowship in Exoplanets Exploration, 'created to inspire the next generations of explorers seeking to learn more about planets, and possibly life around the stars.'
[3] Source: www.setileague.org Accessed September 14, 2008.
[4] Source: *What is the Drake Equation?* by Steve Ford, WB8IMY
The Drake Equation: N = R* fp ne fl fi fc L
where,
* N = The number of communicative civilizations
* R* = The rate of formation of suitable stars (stars such as our Sun)
* fp = The fraction of those stars with planets. (Current evidence indicates that planetary systems may be common for stars like the Sun.)
* ne = The number of Earth-like worlds per planetary system
* fl = The fraction of those Earth-like planets where life actually develops
* fi = The fraction of life sites where intelligence develops
* fc = The fraction of communicative planets (those on which electromagnetic communications technology develops)
* L = The "lifetime" of communicating civilizationsAvailable from:
Available from: http://www.setileague.org/general/drake.htm Accesed September 15, 2008.
[5] Source of Fig. 1.: http://www.physics.utah.edu/~cassiday/p1080/lec06.html
Accesed July 25, 2008.
[6] Source of Fig. 2. : http://www.physics.utah.edu/~cassiday/p1080/lec06.html
Accesed July 25, 2008.
[7] Quoted from: http://www.carlsagan.com/ Accesed May 22, 2007.
[8] Similar reference to the projection of dreams and on current mythology and storytelling was suggested by Krupp (1992).
[9] Available from: http://www.nasa.gov/externalflash/NASA45/textonly/history.html
Accesed November 4, 2007.
[10] According to NASA (1977a.) *Pioneer Oddysey:* "Dr. Sagan also was enthusiastic about the idea of a message on Pioneer. He and Dr. Drake designed a plaque, and Linda Salzman Sagan prepared artwork which was presented to the National Aeronautics and Space Administration which accepted it for this first spacecraft from the Solar System into the Galaxy."
Available from: http://history.nasa.gov/SP-349/epilog.htm Accesed September 15, 2008.
[11] Source of Fig. 3.: NASA, 1977a. *Pioneer Oddysey*. NASA Scientific and Technical Information Office.
USA: NASA, Scientific Publication 349/396 (SP-349/396). Available from: http://history.nasa.gov/SP-349/sp349.htm (Accessed 4 September 2008).
[12] Pulsar is a degenerate neutron star; small and extremely dense; rotates very fast and emits regular pulses of polarized radiation. As Havel (1996) noted, first pulsar was discovered in 1967.
[13] Available from: http://nssdc.gsfc.nasa.gov Accesed May 24, 2007
[14] Source: http://images.ksc.nasa.gov/photos/1977/low/KSC-77P-0196.gif Accesed September 15, 2008.
[15] Available from the JPL web page – Interesting Facts about Voyager Mission http://voyager.jpl.nasa.gov/mission/didyouknow.html, Accesed June 21, 2007.
[16] Available from the JPL web page – Interesting Facts about Voyager Mission http://voyager.jpl.nasa.gov/mission/didyouknow.html, Accesed June 21, 2007.
[17] The position of the probes was according to the Operation Status Report #1215 in February 2002:
- 12,540,000,000 km (7,792,000,000 mi) for Voyager I
- 9,925,000,000 km (6,167,000,000 mi) for Voyager II
Available from: http://voyager.jpl.nasa.gov/spacecraft/index.html Accesed December 18, 2007.
[18] Available from: http://www2.jpl.nasa.gov/saturn/gif/saturn54.gif Accesed September 15, 2008.
[19] This idea originates from Dr. Ferraro, my lecturer from Durham University. Change and Development lecture, March 3, 2008. Dr. Ferraro stressed out that the UN Report expresses the new

understanding of space. In 20th century we saw our planet from the space for the first time and the world became something external to the observer. Dr. Ferraro pointed out that since our planet is considered globe, we deal with global problems. The external view might also indicate that the objective scientific knowledge is possible.

[20] Source: http://grcimagenet.grc.nasa.gov/GRCDigitalImages/1982/1982_07250L.jpg Accesed September 15, 2008.

[21] Quoted from: http://www.carlsagan.com/ Accesed May 22, 2007.

[22] Source: http://sse.jpl.nasa.gov/timeline/images/thumbs/Earth.jpg Accesed September 15, 2008.

[23] Quoted from: http://www.carlsagan.com/. Accesed May 22, 2007.

[24] Quoted from: http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html . Accesed May 22, 2007.

[25] Source: http://sse.jpl.nasa.gov/multimedia/display.cfm?IM_ID=1779. Accesed December 18, 2007.

[26] 'Electroplated onto a 2 cm area on the cover is also an ultra-pure source of uranium-238 (with a radioactivity of about 0.26 nanocuries and a half-life of 4.51 billion years), allowing the determination of the elapsed time since launch by measuring the amount of daughter elements to remaining U238.' Source http://nssdc.gsfc.nasa.gov Accesed May 24, 2007

[27] Quoted from: http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html . Accesed December 18, 2007.

[28] Available from: http://www.carlsagan.com/. Accesed May 22, 2007.

[29] Source: http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html Accesed September 15, 2008.

[30] Quoted from: http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html . Accesed December 18, 2007.

[31] 'The images are encoded in analog form. The remainder of the record is in audio, designed to be played at 16-2/3 revolutions per minute.' Quoted from: http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html . Accesed May 22, 2007.

[32] Available from: http://www.carlsagan.com/. Accesed May 22, 2007.

[33] Jon Lomberg collaborated with Carl Sagan on the book Cosmos. Lomberg created the artist concepts drawings. For more detail please see: http://www.jonlomberg.com/

[34] Quoted from: http://www.carlsagan.com/ Accesed May 22, 2007.

[35] Another important objection lodged by Havel (1998) is addressed to the sensory equipment. Havel pointed that the message was intended for sighted beings that have the natural potential of sensory evaluation. This probably refers also to the symmetry of evolution. We will leave this concept aside from our concern.

[36] The text originally in Czech language, this is my translation.

[37] Quoted from: http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html . Accesed December 18, 2007.

[38] Available from: http://voyager.jpl.nasa.gov/spacecraft/languages/languages.html . Accesed December 18, 2006.

[39] The speaker of this greeting is six years old son of Carl Sagan. Available from: http://www.carlsagan.com/. Accesed May 22, 2007. Section: Nick Sagan.

[40] This classical piece has also emotional background. It is said to be the only one piece that made Beethoven cry.

[41] Source of descripton of chemical elements: WordWeb 3.03. WordNet Database, Copyright 2003 by Princeton University. Available from: http://www.wordweb.info/WW3

[42] Kuhn, T. S., 1997. *Struktura vedeckych revoluci (The Structure of Scientific Revolutions)*. Translated from English to Czech by Tomas Jenicek. Prague: Oikoymenh. (Originally published in 1962).

[43] IAU, 2006. *Resolution B5, Definition of a Planet in the Solar System*. Available from: www.iau.org (Accessed 1 September 2008).

[44] Not only are the new branches strictly connected to search for EL. Some of those are the result of space exploration programs, e.g. the exogeology or lunar-geology.

[45] Source: http://sse.jpl.nasa.gov/multimedia/display.cfm?IM_ID=1794 Accesed September 15, 2008.

[46] Available from: http://nssdc.gsfc.nasa.gov/planetary/lunar/apollo_11_30th.html. Accesed August 14, 2008.

[47] Part of Carter's text says, 'We cast this message into the cosmos. It is likely to survive a billion years into our future, when our civilization is profoundly altered and the surface of the Earth may be vastly changed. Of the 200 million stars in the Milky Way galaxy, some – perhaps many – may have inhabited planets and spacefaring civilizations. If one such civilization intercepts Voyager and can understand these recorded contents, here is our message: 'This is a present from a small, distant world, a token of our sounds, our science, our images, our music, our thoughts and our feelings. We are attempting to survive our time so we may live into yours. We hope someday, having solved the problems we face, to join a community of galactic civilizations. This record represents our hope and our determination, and our good will in a vast and awesome universe.' Available from: http://www.jpl.nasa.gov/news/features-print.cfm?feature=555 Accesed June 25, 2007.

[48] Available from: http://www.carlsagan.com/. Accesed May 22, 2007.
[49] Available from: http://www.carlsagan.com/. Accesed May 22, 2007.
[50] Text from the Requiem Mass as used in Requiem Mass in D minor, KV 626 by Wolfgang Amadeus Mozart. Available from: http://www.its.caltech.edu/~tan/Mozartreq/main.html Accesed September 14, 2008.